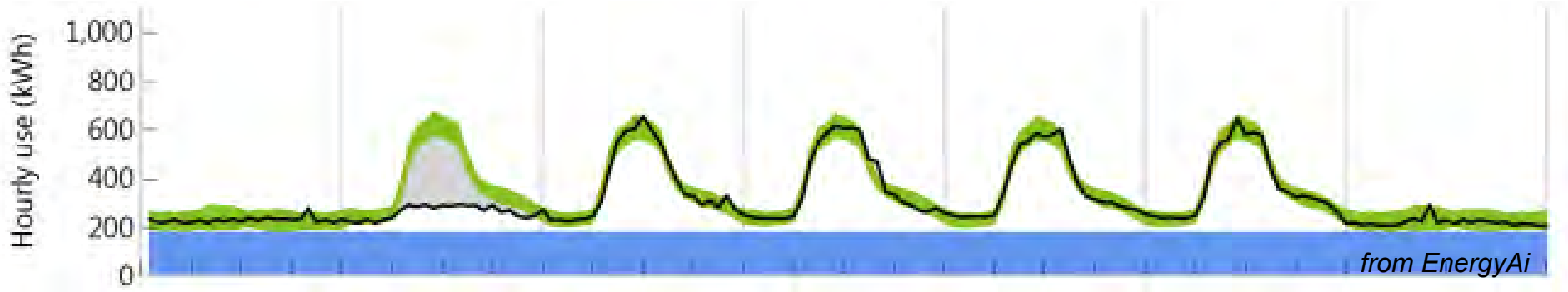
Energy Management Package For Small Commercial Buildings:
Training Session

Jessica Granderson, Robin Mitchell
Lawrence Berkeley National Laboratory
November 13 , 2014



U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Ben Goldstein, Building Technologies Office

Agenda

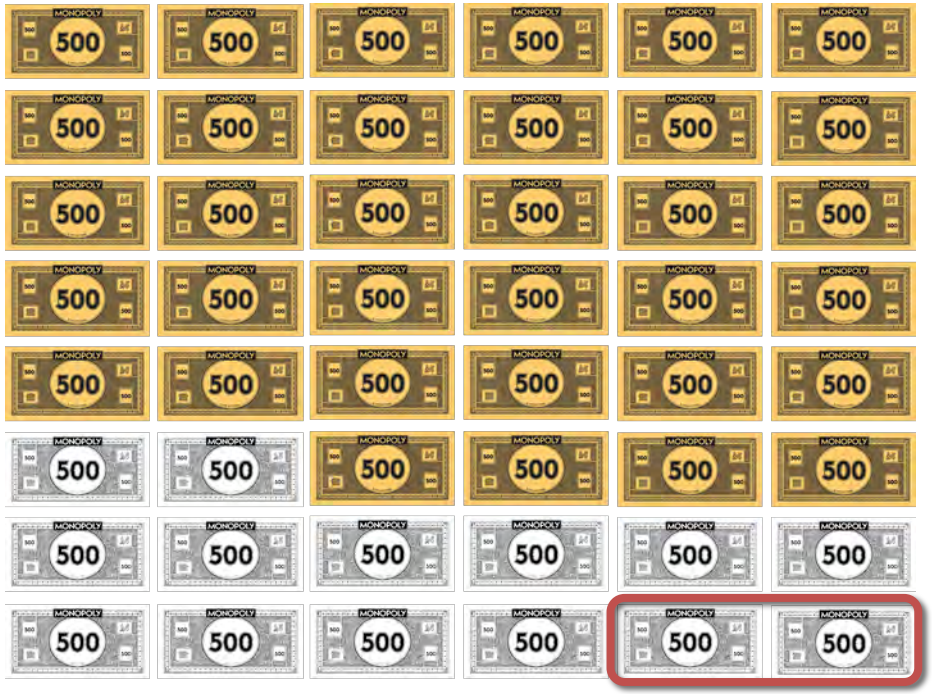
1. Background
2. Introduction to the Energy Management Package
3. Short Q&A
4. Guidance on accessing data, tools and package
5. Data analysis exercise
6. Overview of business model and value proposition
7. Maximizing Success, Lessons Learned

Why Target Small Commercial?

Buildings less than 50,000 sf consume **44%** of total commercial building energy.

95% of commercial buildings are less than 50,000 sf.

Why Target Small Commercial?



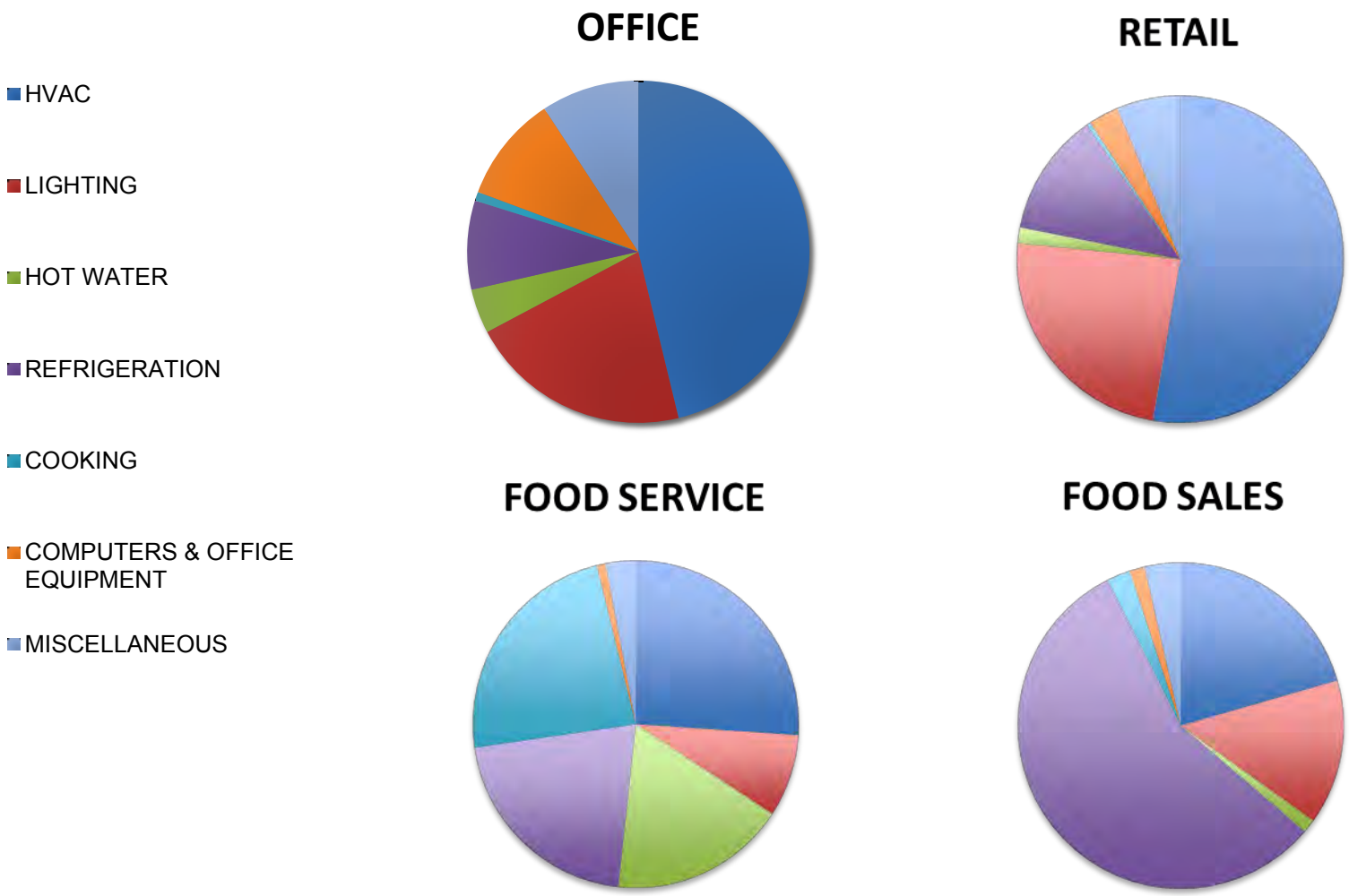
On average, **$23,000** is spent on utilities every year in a small commercial building.

Cost-effective energy upgrades could reduce that by **30%**.

We're targeting 3-5% savings

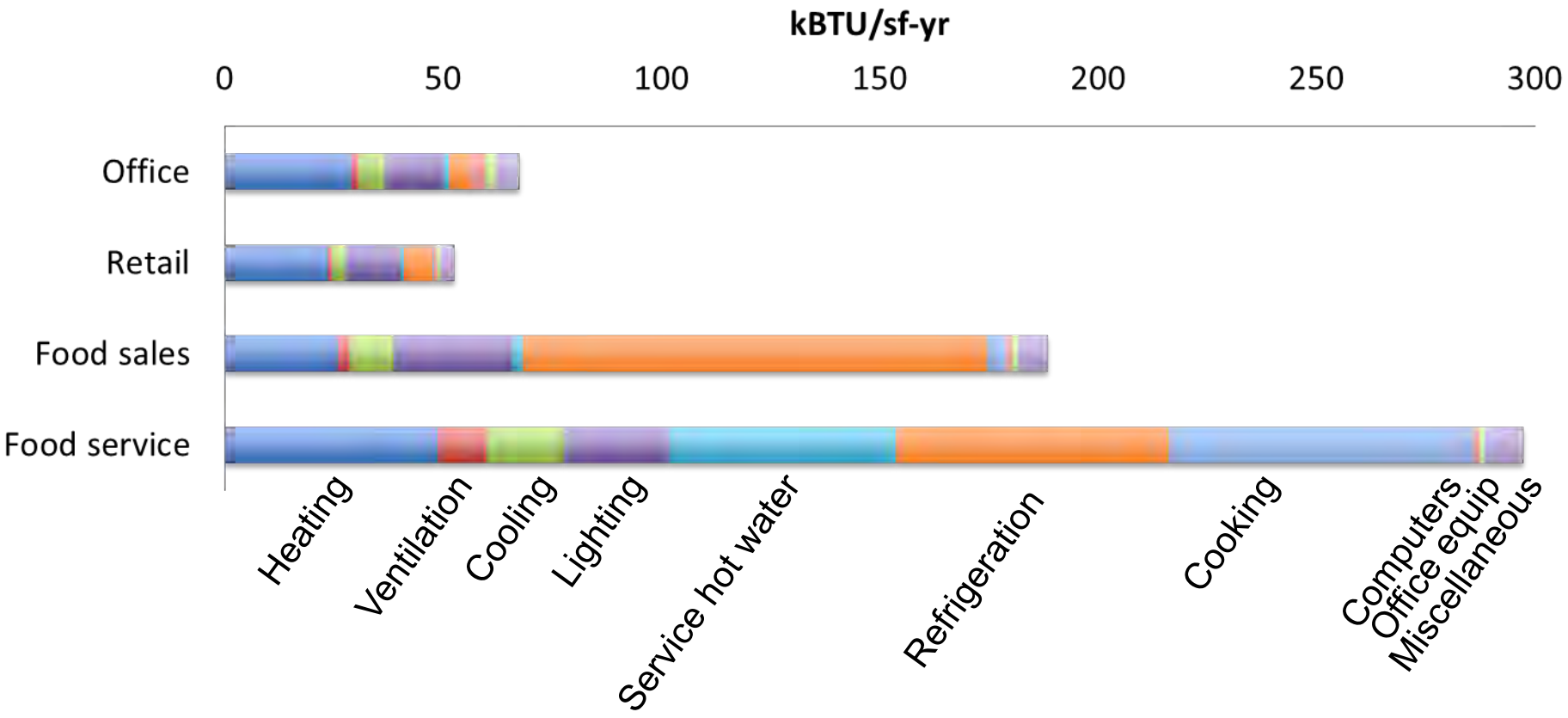
Why Target Small Commercial?

What is the biggest use of energy in small commercial buildings?



Why Target Small Commercial?

How do small commercial buildings use energy?



In spite of the opportunities the small commercial market has been underserved relative to efficiency services – tight margins, lack of energy mgt staff

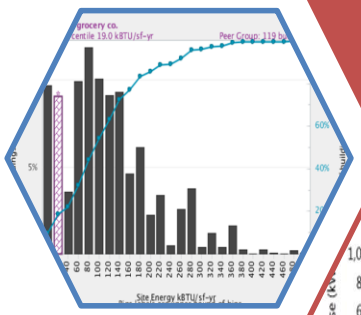
Agenda

1. Background
2. Introduction to the Energy Management Package
3. Short Q&A
4. Guidance on accessing data, tools and package
5. Data analysis exercise
6. Overview of business model and value proposition
7. Maximizing Success, Lessons Learned

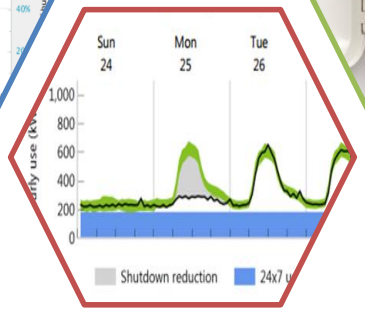
Introduction to the EMP

Offering for HVAC contractors to expand services, consider whole-building efficiency
Low transaction costs are critical in serving small building sector -4hrs, twice/yr
5 steps to identify low/no-cost energy improvements targeting 3-5% savings
Leveraging free, inexpensive tools

E1
Analyze monthly data & benchmark



E2
Analyze interval data



E3
Walkthrough

E4
Communicate with owner

E5
Check results

Technical Elements

Element	Activity	Package elements
E1	Analyze utility data & Benchmark relative to peers	Guidelines for how to analyze data and benchmark, Worksheet for analysis and tracking, List of some available tools
E2	Analyze interval data (hourly, 15min)	Guidelines on how to obtain and analyze data, Worksheet for analysis and tracking, List of some available tools
E3	Walkthrough	Checklist of things to look for, for example - programmed thermostat - occupancy sensors, location & presence Guidelines on how to problems
E4	Communicating with owner	Guidelines on how to sell energy efficiency upgrades, Automated template to summarize status and recommendations, Resources to identify incentives, Tips on working with owner to set goals
E5	Check results	Guidelines on how to evaluate results, Worksheet for analysis and tracking, Tips on how to proceed

Technical Elements: Available Tools

The package makes use of already available, free or low-cost software to do the recommended analyses. The package contains a list of relevant tools.

Examples of tools are provided for informational purposes only. Those listed here and in the package are representative but not comprehensive.

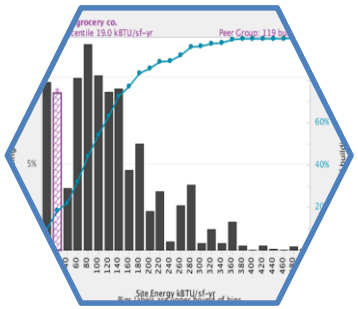
Technical Elements: Pilot Building

To illustrate the package analysis, we use a site from the pilot demonstration:

- Fast food restaurant
- 3000 sq ft
- Bay area location
- About $26,000/yr energy costs

Element 1: Monthly Data & Benchmarking

Analyze monthly data & benchmark



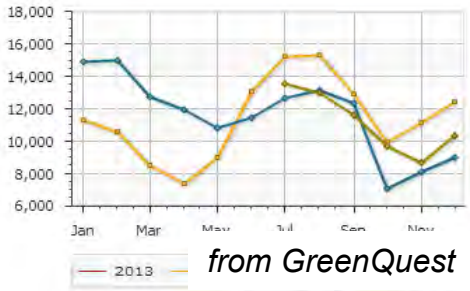
Requires:

- At least 1 year of monthly electricity and fuel use;
- Building floor area & type;
- 30-60 minutes

A) What are the seasonal patterns?

from Noesis

B) How does this year compare with the previous year?



from GreenQuest

C) How does my building compare to others?

- Energy use intensity (kBTU / sf – yr)
- % of buildings with higher EUI (Energy Star Score)

from GreenQuest

Element 1: Monthly Data & Benchmarking

E1 Benchmarking and Analysis of Monthly Energy Use

Plan to spend about 30-40 minutes on this element, including uploading the data

A list of tools that you could use for this analysis is provided at the end of these guidelines. The tools listed are generally intuitive to use and provide tool-specific instructions online.

Step 1 Gather & upload data

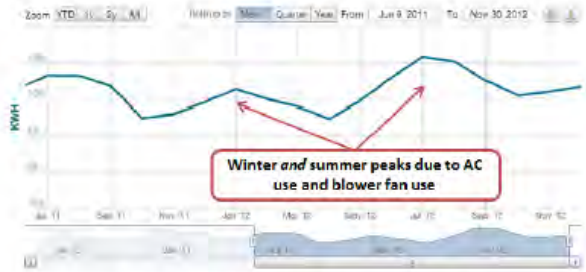
Gather ideally two years of monthly electricity and gas/oil use data (if two years is not available, use whatever is available). This can be downloaded from a utility website (see Obtaining Data in the Overview) or gathered from paper utility bills. Using an electronic file is highly recommended if possible, as manual data entry can be very time intensive.

Record additional building characteristics such as building type, floor area and year built on the Worksheet.

Step 2 Patterns in monthly energy use

Use a monthly energy analysis tool to plot the last year's energy use data. Look at total energy as well as fuel (gas, oil) and electricity.

- If you typed in your energy data by hand in Step 1, look for any data entry errors indicated by significant deviations from the annual pattern and verify that data is entered correctly.
- Look at the electricity and gas use pattern over the year: typically electricity use increases during periods of heavy air conditioner use in the summer, and gas or oil usage increases with heating use during the winter.
- Food Service and food sales buildings may have high equipment loads that dominate seasonal conditioning trends.



Monthly electricity use plotted over time using Noesis.

Note seasonal patterns in energy usage, displaying electricity and fuel use separately.

E1 Benchmarking and Monthly Data Analysis Worksheet

Building:_____ City:_____ Zip:_____ Date:_____

STEP 1 Gather Data

Who pays electricity and gas bills? owner tenant Name: _____

Is energy use or cost currently tracked? yes no how?_____

Either: ☐ Get paper utility bills from owner/tenant. Get two or more years if available.

☐ Download from utility website. Filename:_____ Utility: _____

Username:_____ Password: _____

☐ Other: _____

Building type (circle): office retail food service food sales other_____

Floor area: _____ **Year built:** _____

Tool(s) used: _____ Username:_____ Password: _____

Note: Some tools can automatically generate a summary report. Use this worksheet to highlight key elements on the summary report and supplement that information where needed.

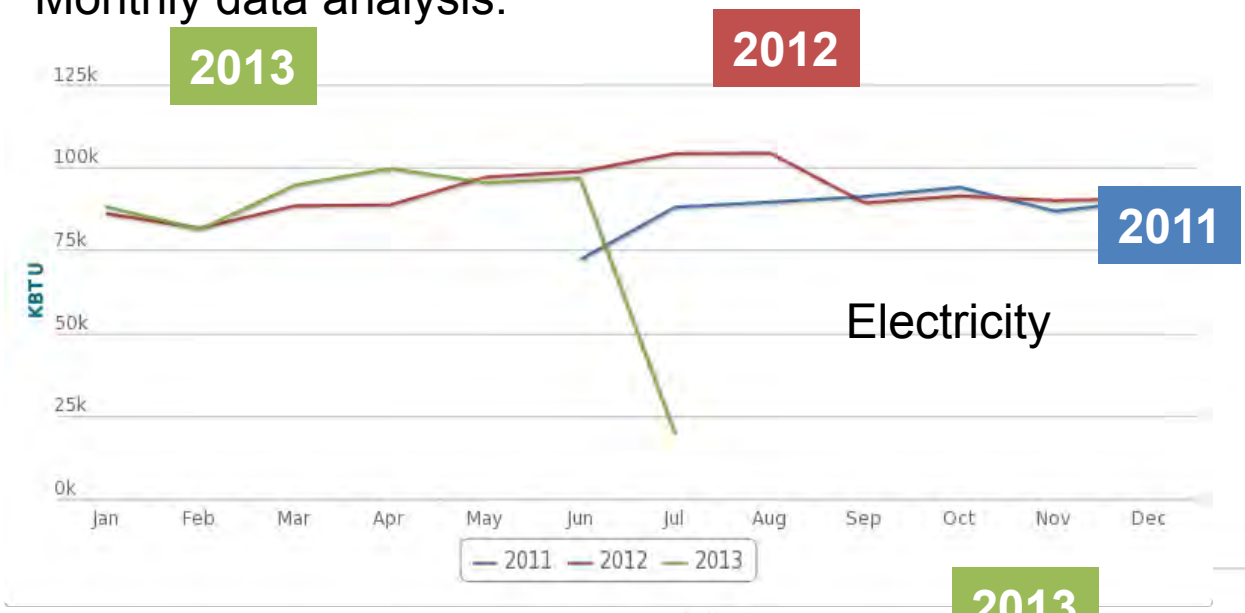
STEP 2 Patterns in monthly energy usage

Total monthly energy usage	**Peak season (circle):** Summer Autumn Winter Spring All months similar irregular/other: _____ **As expected?** yes / no Notes:
Electricity usage	**Peak season (circle):** Summer Autumn Winter Spring All months similar irregular/other: _____ **Electric fuel source?** AC: yes / no Heat: yes / no **Pattern as expected?** yes / no Notes:
Gas/Oil usage	**Peak season (circle):** Summer Autumn Winter Spring All months similar irregular/other: _____ **Primary gas/liquid fuel:** natural gas oil propane other: _____ **Gas/oil fuel source?** Heat: yes / no AC : yes(unusual) / no **As expected?** yes / no Notes:

Each element contains a set of guidelines (left) and a worksheet (right).

Element 1: Pilot Building

Monthly data analysis:



Electricity

At the fast food restaurant, electricity use is relatively constant, year to year.

But natural gas use has increased over the past year.

Natural Gas

Element 1: Pilot Building

Benchmarking: Because Energy Star does not rate restaurants, EnergyIQ was used to benchmark the site against all fast food restaurants in California.

Define Peer Group

Select floor area, vintage, and location.

Then, select your building types.

FLOOR AREA
- [ ] All sizes
- [x] 0 - 25000 sq. ft.
- [ ] 25000 - 150000 sq. ft.
- [ ] over 150000 sq. ft.

VINTAGE
- [x] All years
- [x] 1991 - Present
- [x] 1979 - 1990
- [x] 1941 - 1978
- [x] 1901 - 1940
- [x] Pre-1900
- [x] Unknown

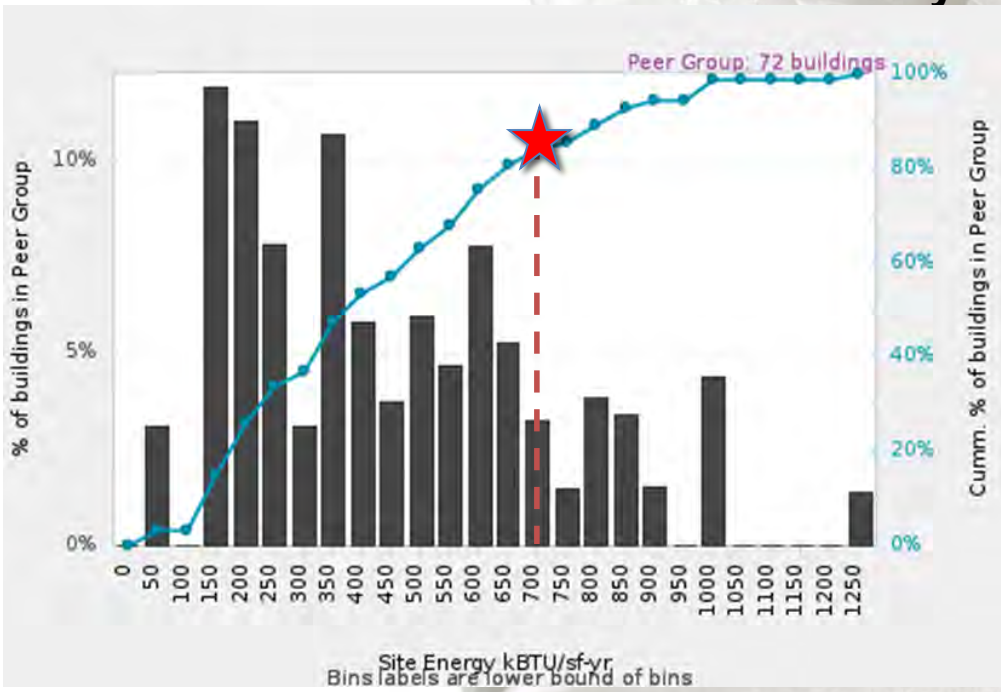
LOCATION [MAP]
- [x] All Locations
- [x] Central Coast
- [x] Central Valley
- [x] Desert
- [x] Mountains
- [x] North Coast
- [x] South Coast
- [x] South Inland

- [ ] OFFICE
  - [ ] Administration and Management
  - [ ] Financial/Legal
  - [ ] Insurance/Real Estate
  - [ ] Government Services
  - [ ] Software Development
  - [ ] Medical/Dental Office
  - [ ] Assorted/Multi-tenant
  - [ ] Other Office
- [ ] DATA CENTER
- [ ] LABORATORY
- [ ] RESTAURANT
  - [x] Fast Food or Self Service
  - [ ] Specialty/Novelty food service
  - [ ] Table Service
  - [ ] BAR/Tavern/Nightclub/Other
  - [ ] Other Food Service
- [ ] FOOD STORE
  - [ ] Supermarkets
  - [ ] Small General Grocery
  - [ ] Specialty Ethnic Grocery
  - [ ] Convenience Store
  - [ ] Liquor Store
  - [ ] Other Food Store
- [ ] RETAIL
- [ ] WAREH
- [ ] WAREH
- [ ] HEALTH
- [ ] SCHOO
- [ ] COLLE

EnergyIQ
ACTION-ORIENTED ENERGY BENCHMARKING

energyiq.lbl.gov

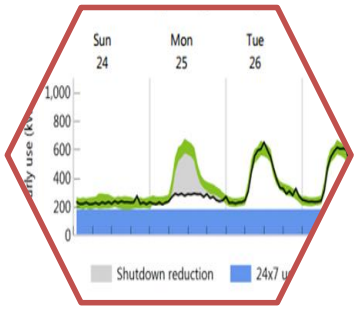
This fast food restaurant uses **729 kBTU/sf-yr**



85% of fast food restaurants in California use less energy per square foot

Element 2: Interval Data

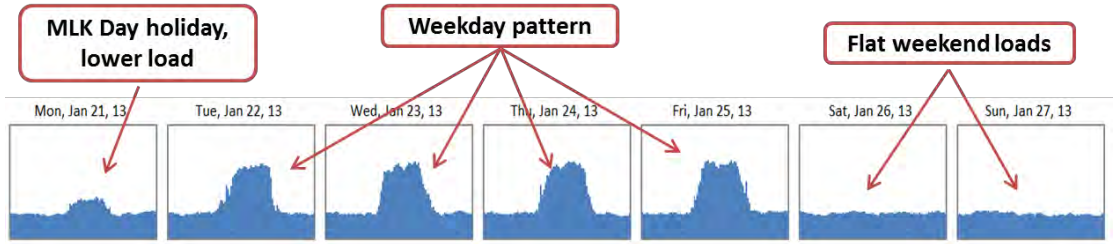
Analyze interval data



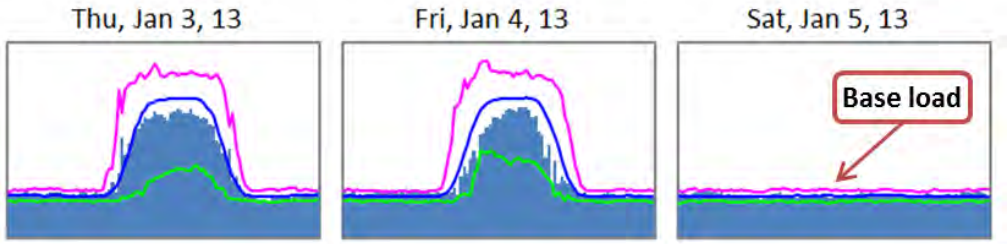
Requires:

- 3-12 months of hourly (smart meter) electricity data
- 30-60 minutes

A) Are the daily and weekly load schedules as expected?



B) How much energy is used at night and on weekends (Base load)?



from BizEE

C) Are there spikes or unusual activity ?

D) Can peak loads be reduced or shifted to non-peak periods in the day?

E) Are there changes over time?

Element 2: Interval Data

E2 Interval Data Analysis Guidelines

Plan to spend about 20-30 minutes reviewing a building's interval energy use data.

STEP 1 Upload data

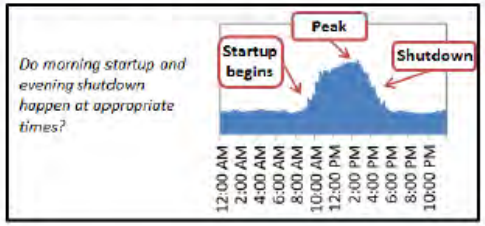
Load interval data into the program. You need at least one month (as much as 6-13 months for some tools) of electricity use data reported every hour (or every 30, 20, 15 minutes). See 'Obtaining Interval Data'. At the end of this document, there is a list of tools that can be used for the analysis in this element.

STEP 2 Daily and weekly load schedule

Display electricity use data vs. time for a few weeks of interval energy use data.

Energy use for each day in the month of October 2006 using ECAM (from ECAM instruction manual). Note weekday vs. weekend schedule is typical, with abnormal activity on Saturday October 21.

Does the daily load profile have the same shape as you would expect? Specifically:



E2 Interval Data Analysis Worksheet

Building:_____
Date:_____

STEP 1: Obtain & upload interval energy use data

Either: ☐ Get file from owner. File name: _____

☐ Download file from utility website (recommended)

Filename: _____ Utility: _____

Username:_____ Password: _____

Building floor area: _____ **Operating hours**:_____

Building type:(circle): office retail food service food sales other_____

Tool used to display interval data: _____

STEP 2 Daily and Weekly Scheduling:

☐ Printed a plot of a week or several weeks of daily loads

Weekly pattern (circle): Weekend load compared w/ typical: As owner expected?	all days similar weekday/weekend weekday/Sat/Sun irregular/other: _____ same slightly lower much lower base load level yes / no
Holiday loads compared w/ typical: Which holidays (circle): As owner expected?	same slightly lower much lower base load level 1/1 MLK Pres. Mem. July4 Labor Colum. Vet. ThnksGiv 12/24 12/25 other:_____ yes / no
Typical day scheduling: As owner expected?	Startup begins: _____ Startup ends: _____ Shutdown begins:_____ Shutdown ends:_____ yes / no
Notes on irregular activity: *Include times where equipment may be running unnecessarily.*	

STEP 3 Base Load:

Base load level: _____ Typical daily maximum level _____
Base load to daily maximum ratio: _____ *Divide base load by typical daily max*
• *If ratio above is greater than 0.50, look for opportunities to deepen setbacks.*

Element 2: Interval Data

Options:

- Do analysis yourself
- Order automated analysis

Sample report page from EnergyAI

Shutdowns

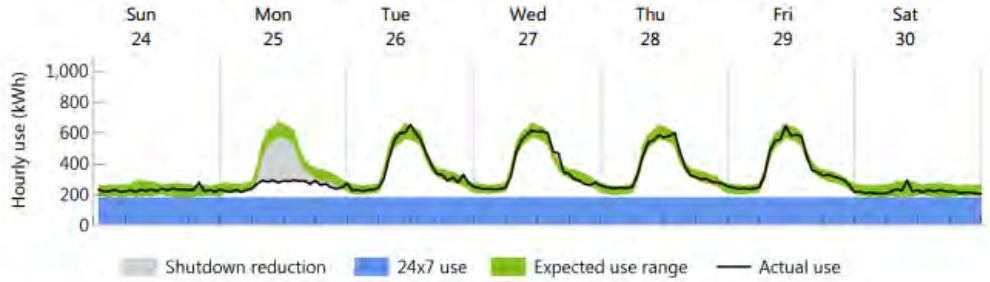
8 days Number of "shutdown" days in the analysis period - electricity use was much lower than expected, and was flat for most of the day.

16,700 kWh Reduced electricity use during the shutdown days. If use had been in the "expected range" for these days, this is how much additional electricity would have been used.

$2,250 Estimated cost savings from the reduced electricity use.

A "shutdown day" occurs when equipment which can be turned off is shut down for most hours of the day. This is a day when the load is expected to rise and fall, but instead is flat and near the 24x7 demand. Shutdown days often occur around holidays.

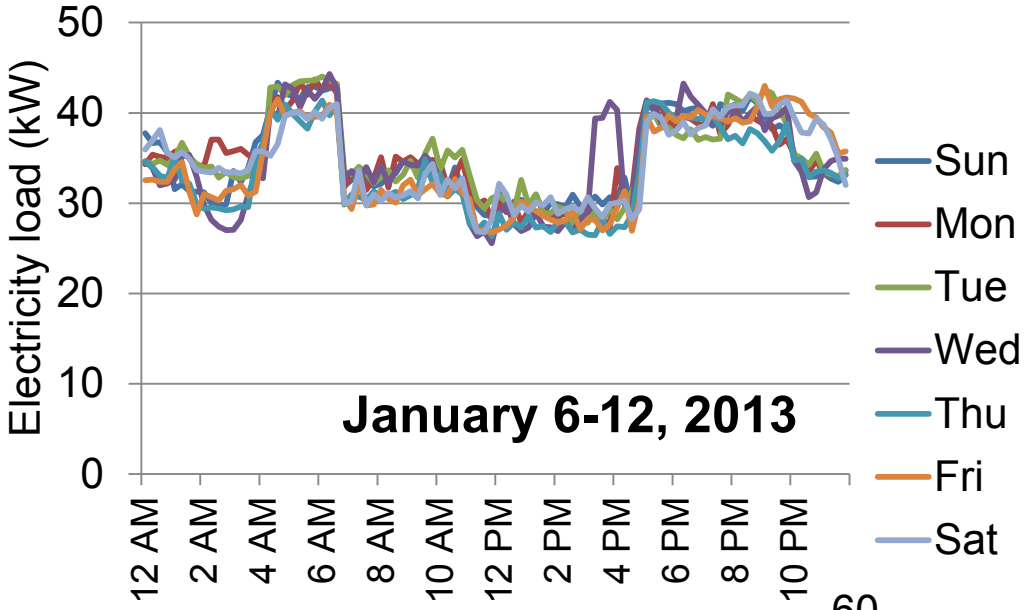
For example, the week beginning Sunday, 24 May 2009 has one shutdown day:

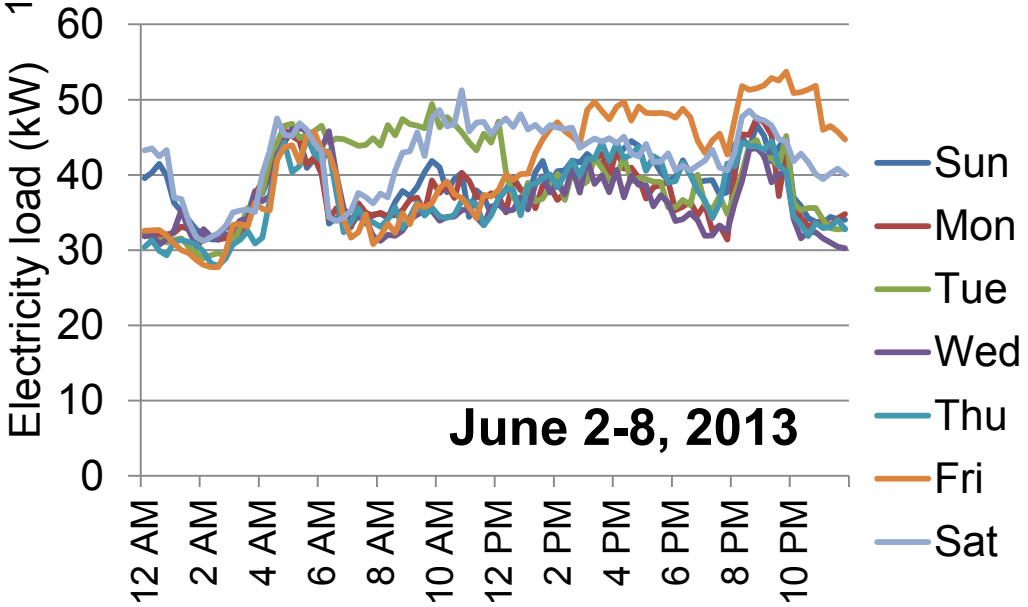


The 8 shutdown days occurred in 5 periods:

Shutdown Period	Reduced use (kWh)	Reduced cost ($)	Holidays
Mon, 25 May 2009	2,180	294	Memorial Day
Mon, 7 Sep 2009	2,620	405	Labor Day
Sat, 10 Oct - Mon, 12 Oct 2009	5,060	704	Columbus Day
Wed, 11 Nov 2009	2,050	250	Veterans Day
Thu, 26 Nov - Fri, 27 Nov 2009	4,830	592	Thanksgiving Day

Element 3: Pilot Building





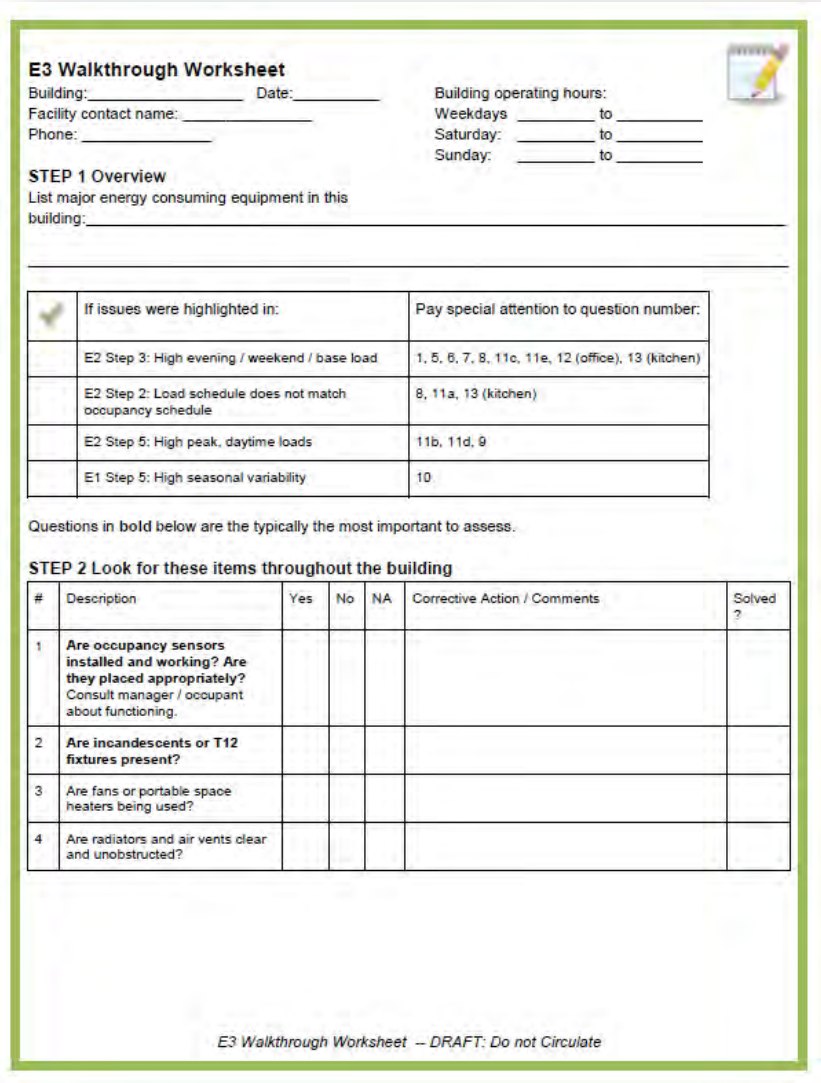
Element 3: Walkthrough

Walkthrough

1 hour walkthrough at building site

Check lighting & thermostat settings

Consult with manager about energy management practices



E3 Walkthrough Worksheet

Building:_____ Date:_____
Facility contact name: _____
Phone: _____

Building operating hours:
Weekdays _____ to _____
Saturday: _____ to _____
Sunday: _____ to _____

STEP 1 Overview

List major energy consuming equipment in this building:_____

✓	If issues were highlighted in:	Pay special attention to question number:
	E2 Step 3: High evening / weekend / base load	1, 5, 6, 7, 8, 11c, 11e, 12 (office), 13 (kitchen)
	E2 Step 2: Load schedule does not match occupancy schedule	8, 11a, 13 (kitchen)
	E2 Step 5: High peak, daytime loads	11b, 11d, 9
	E1 Step 5: High seasonal variability	10

Questions in **bold** below are the typically the most important to assess.

STEP 2 Look for these items throughout the building

#	Description	Yes	No	NA	Corrective Action / Comments	Solved ?
1	**Are occupancy sensors installed and working? Are they placed appropriately?** Consult manager / occupant about functioning.					
2	**Are incandescents or T12 fixtures present?**					
3	Are fans or portable space heaters being used?					
4	Are radiators and air vents clear and unobstructed?					

E3 Walkthrough Worksheet – DRAFT: Do not Circulate

Element 3: Walkthrough

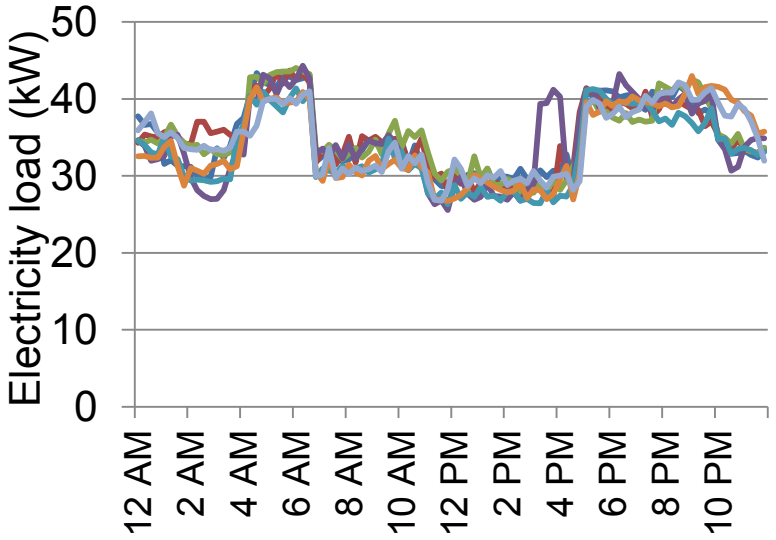
Specific walkthrough questions (bold are most important)

1. **Are occupancy sensors installed and working? Are they placed appropriately?**
2. **Are incandescent or T12 fixtures present?**
3. Are fans or portable space heaters being used?
4. Are radiators and air vents unobstructed?
5. **Are employees trained in energy conservation measures?**
6. **Are doors/windows kept closed during heating and cooling season?**
7. Are computers and monitors set to sleep or off at night?
8. Are lights scheduled? (time-based on/off control)?
9. What is the most common HVAC complaint?
10. Are vending machines set to turn off/sleep at off hours?
11. **Are thermostats programmed? (see 8a-8e) Are thermostats manually setback during off-hours?**
    1. Does the setback schedule match occupancy schedule?
    2. Is heating setpoint for occupied hours 70°F or lower?
    3. Is heating setpoint for off-hours 62°F or lower?
    4. Is AC setpoint for occupied hours 75°F or higher?
    5. Is AC setpoint for off-hours 78°F or higher?
12. **Office: Are copy machines, printers & fax machines shut off at the end of the day?**
13. **Kitchen: Do you have a start-up/shutdown schedule for all equipment? Is equipment running or idling longer than necessary?**
14. **Kitchen: Is there a service maintenance schedule?**
15. Kitchen: Are dishwashers only run when full?

Element 3: Pilot Building

Walkthrough findings at the fast food restaurant:

- Reduce parking lighting hours
- Reduce dining room lighting hours / levels
- Adjust thermostat setback temp & timing

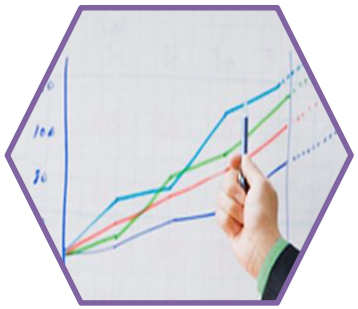


Other possible issues to check:

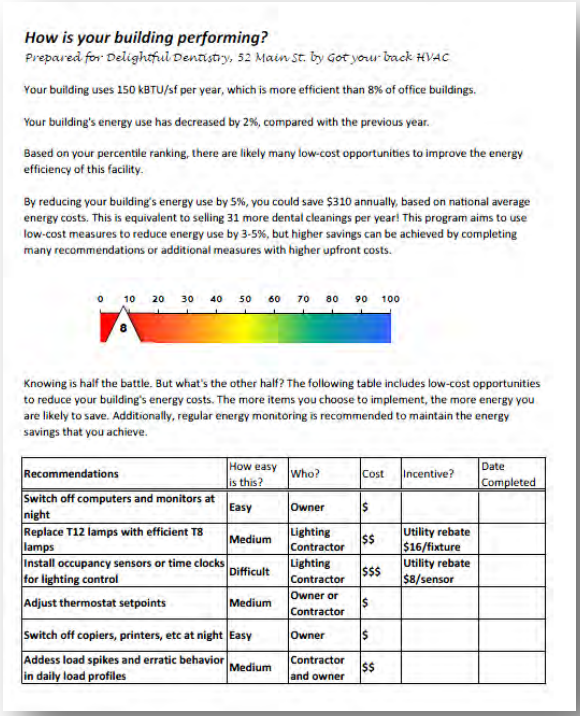
- Check gaskets on refrigeration units
- Consider more efficient cooking equipment options

Element 4: Communicate with Owner

Communicate with owner



- Tips on pitching efficiency measures
- Tool to generate summary (right)
- Incentive identification
- Goal setting guidelines
  - *"I think together we can improve the Energy Star Score by 5 points this year."*



How is your building performing?

Prepared for: Delightful Dentistry, 52 Main St. by Got your back HVAC

Your building uses 150 kBTU/sf per year, which is more efficient than 8% of office buildings.

Your building's energy use has decreased by 2%, compared with the previous year.

Based on your percentile ranking, there are likely many low-cost opportunities to improve the energy efficiency of this facility.

By reducing your building's energy use by 5%, you could save $310 annually, based on national average energy costs. This is equivalent to selling 31 more dental cleanings per year! This program aims to use low-cost measures to reduce energy use by 3-5%, but higher savings can be achieved by completing many recommendations or additional measures with higher upfront costs.

0 10 20 30 40 50 60 70 80 90 100

8

Knowing is half the battle. But what's the other half? The following table includes low-cost opportunities to reduce your building's energy costs. The more items you choose to implement, the more energy you are likely to save. Additionally, regular energy monitoring is recommended to maintain the energy savings that you achieve.

Recommendations	How easy is this?	Who?	Cost	Incentive?	Date Completed
Switch off computers and monitors at night	Easy	Owner	$		
Replace T12 lamps with efficient T8 lamps	Medium	Lighting Contractor	$$	Utility rebate $16/fixture	
Install occupancy sensors or time clocks for lighting control	Difficult	Lighting Contractor	$$$	Utility rebate $8/sensor	
Adjust thermostat setpoints	Medium	Owner or Contractor	$		
Switch off copiers, printers, etc at night	Easy	Owner	$		
Addess load spikes and erratic behavior in daily load profiles	Medium	Contractor and owner	$$		

Element 5: Check Results

Check results

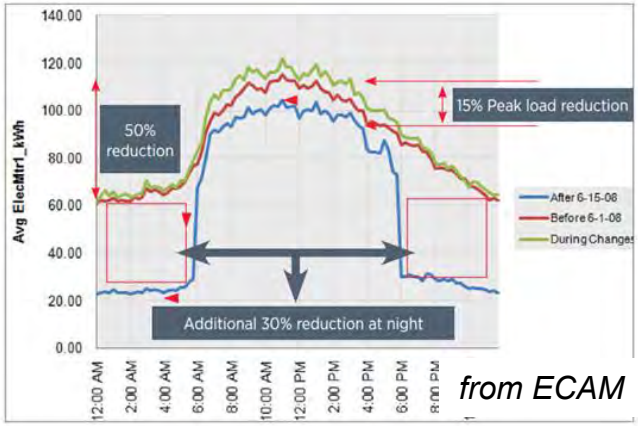
Requires:

- Updated monthly and/or hourly data
- 30-60 minutes

A) How much energy as been saved?

from Noesis

B) Can we verify changes to scheduling?



from ECAM

C) Further steps to energy efficiency

D) Leveraging success in future sales opportunities

Agenda

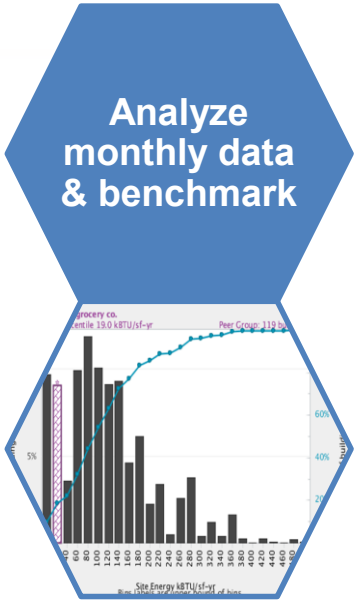
1. Background
2. Introduction to the Energy Management Package
3. Short Q&A
4. Guidance on accessing data, tools and package
5. Data analysis exercise
6. Overview of business model and value proposition
7. Maximizing Success, Lessons Learned

QUESTIONS SO FAR?

Agenda

1. Background
2. Introduction to the Energy Management Package
3. Short Q&A
4. Guidance on accessing data, tools and package
5. Data analysis exercise
6. Overview of business model and value proposition
7. Maximizing Success, Lessons Learned

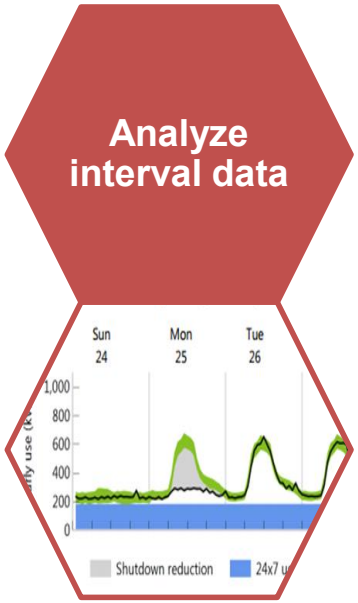
What Data You Need



Monthly Data and Benchmarking

Requires:

- At least 1 year of monthly electricity and fuel use
- Building floor area and type
- 30-60 minutes



Interval Data (hourly or sub-hourly)

Requires:

- 3-12 months of hourly (smart meter) electricity data
- 30-60 minutes

Interval Data Types

XML Data

- Smart Meter data
- Text File
- Not very “human readable”
- Requires software to read it

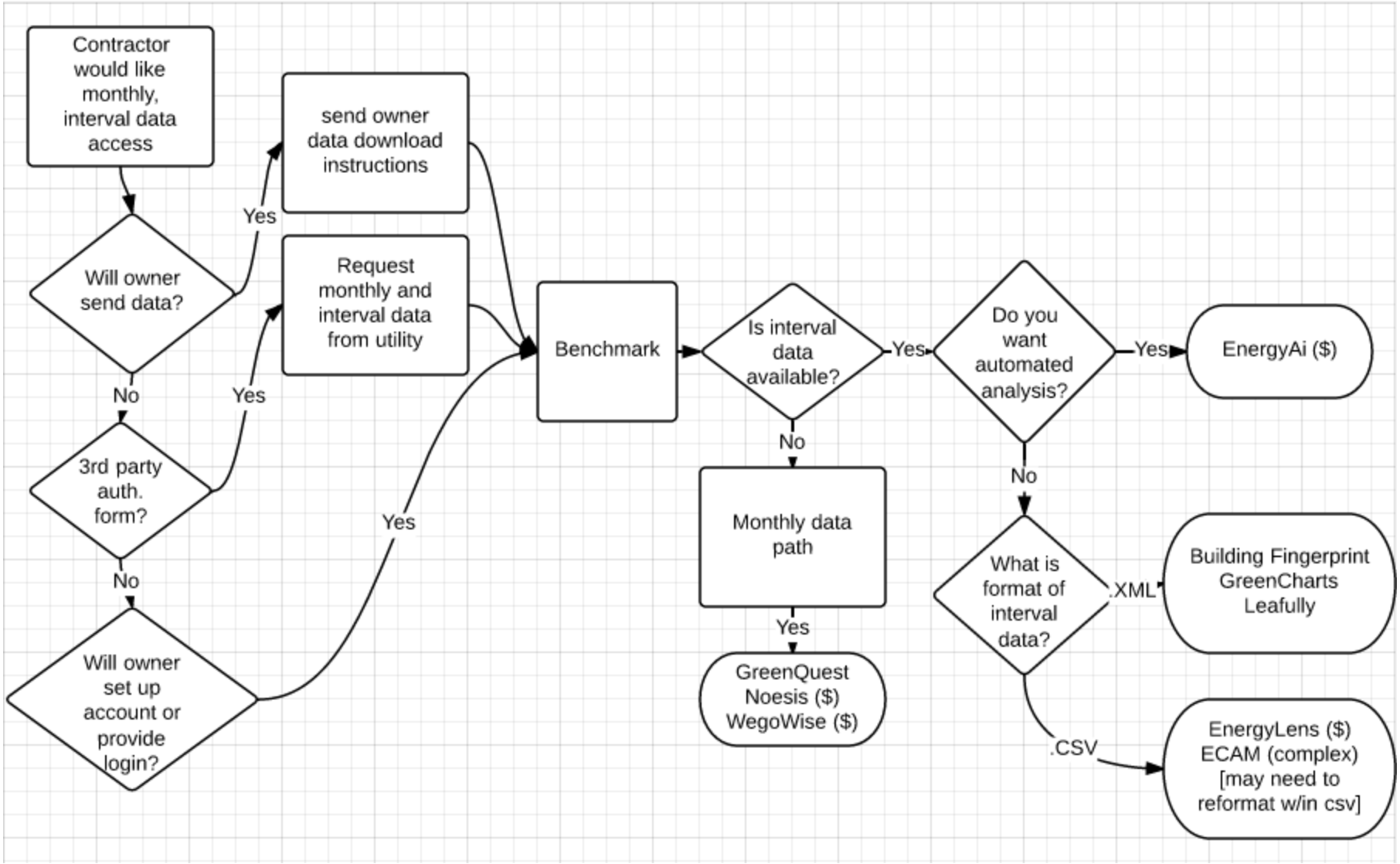
```
<content type="xml">
  <IntervalBlock xmlns="http://naesb.org/espi">
    <interval>
      <duration>34383600</duration>
      <start>1299387600</start>
    </interval>
    <IntervalReading>
      <timePeriod>
        <duration>900</duration>
        <start>1299387600</start>
      </timePeriod>
      <value>732</value>
    </IntervalReading>
    <IntervalReading>
      <timePeriod>
        <duration>900</duration>
        <start>1299388500</start>
      </timePeriod>
      <value>656</value>
    </IntervalReading>
```

CSV Data

- Text file
- Can be imported into Spreadsheet
- Easier for people to understand

TYPE	DATE	START TIME	END TIME	USAGE	UNITS
Electric usage	4/12/2013	0:00	0:14	7.32	kWh
Electric usage	4/12/2013	0:15	0:29	7.92	kWh
Electric usage	4/12/2013	0:30	0:44	8.4	kWh
Electric usage	4/12/2013	0:45	0:59	8.76	kWh
Electric usage	4/12/2013	1:00	1:14	8.16	kWh
Electric usage	4/12/2013	1:15	1:29	7.92	kWh
Electric usage	4/12/2013	1:30	1:44	7.44	kWh
Electric usage	4/12/2013	1:45	1:59	7.32	kWh
Electric usage	4/12/2013	2:00	2:14	7.2	kWh
Electric usage	4/12/2013	2:15	2:29	7.32	kWh
Electric usage	4/12/2013	2:30	2:44	7.32	kWh
Electric usage	4/12/2013	2:45	2:59	7.32	kWh
Electric usage	4/12/2013	3:00	3:14	7.2	kWh
Electric usage	4/12/2013	3:15	3:29	7.2	kWh
Electric usage	4/12/2013	3:30	3:44	7.44	kWh
Electric usage	4/12/2013	3:45	3:59	7.2	kWh
Electric usage	4/12/2013	4:00	4:14	7.32	kWh
Electric usage	4/12/2013	4:15	4:29	7.32	kWh
Electric usage	4/12/2013	4:30	4:44	7.32	kWh
Electric usage	4/12/2013	4:45	4:59	6.72	kWh
Electric usage	4/12/2013	5:00	5:14	7.8	kWh
Electric usage	4/12/2013	5:15	5:29	6.84	kWh
Electric usage	4/12/2013	5:30	5:44	7.2	kWh
Electric usage	4/12/2013	5:45	5:59	7.2	kWh
Electric usage	4/12/2013	6:00	6:14	10.32	kWh
Electric usage	4/12/2013	6:15	6:29	13.56	kWh
Electric usage	4/12/2013	6:30	6:44	13.08	kWh

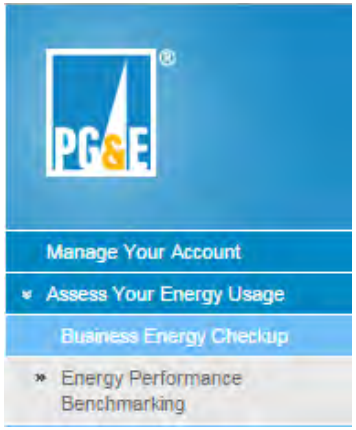
Accessing Data



Data Analysis Software Tools

https://sites.google.com/a/lbl.gov/emp/softwaretools

Monthly Data	Benchmarking	Interval Data
	ENERGY STAR Portfolio Manager PGE My Energy Web Services	PGE My Energy website
GreenQuest Free online One building per login account.	Energy IQ Free	Building Energy Fingerprint Free, online, PDF report (XML)
Noesis $$, online	Target Finder Free, online	Leafully Free, online (XML)
WegoWise $$, online	WegoWise $$, online	Green Charts Free, online (XML)
		Green Button Grapher Free, online (XML)
		Energy Ai $$, PDF Report (CSV)



Data from PGE

- Set up a **My Energy** account
  http://www.pge.com/en/mybusiness/account/diy/index.page
- **Business Energy Checkup**
  - Track your energy use
  - http://www.pge.com/en/mybusiness/account/diy/businesscheckup.page
- ENERGY STAR **Portfolio Manager** connection for benchmarking
  - http://www.pge.com/en/mybusiness/account/diy/benchmarking.page
- Lots of information on the PGE website

Agenda

1. Background
2. Introduction to the Energy Management Package
3. Short Q&A
4. Guidance on accessing data, tools and package
5. Data analysis exercise
6. Overview of business model and value proposition
7. Maximizing Success, Lessons Learned

Sample Building: Office

Building Type	Office (Small-Med Biz TOU Med Use - PGE)
Location	Lathrop, CA 95330
Year Built	1960
Floor Area	2,000
Number of occupants	15
Hours Occupied	50 (8 am – 6 pm, 10 hrs / day, 5 days / wk)
Interval data period	3/6/2011 – 4/6/2012

	Electricity	Gas
	Cooling / lighting / plug loads	Heating
Annual consumption	11,247 kWh	200 therms
Per SF	5.6 kW/sf (19 kBtu/sf)	0.10 therms/sf (10 kBtu/sf)
Annual cost	$ 2,024	$190
Cost / unit of fuel	$ 0.18 / kWh	$ 0.95 / therm

Benchmarking

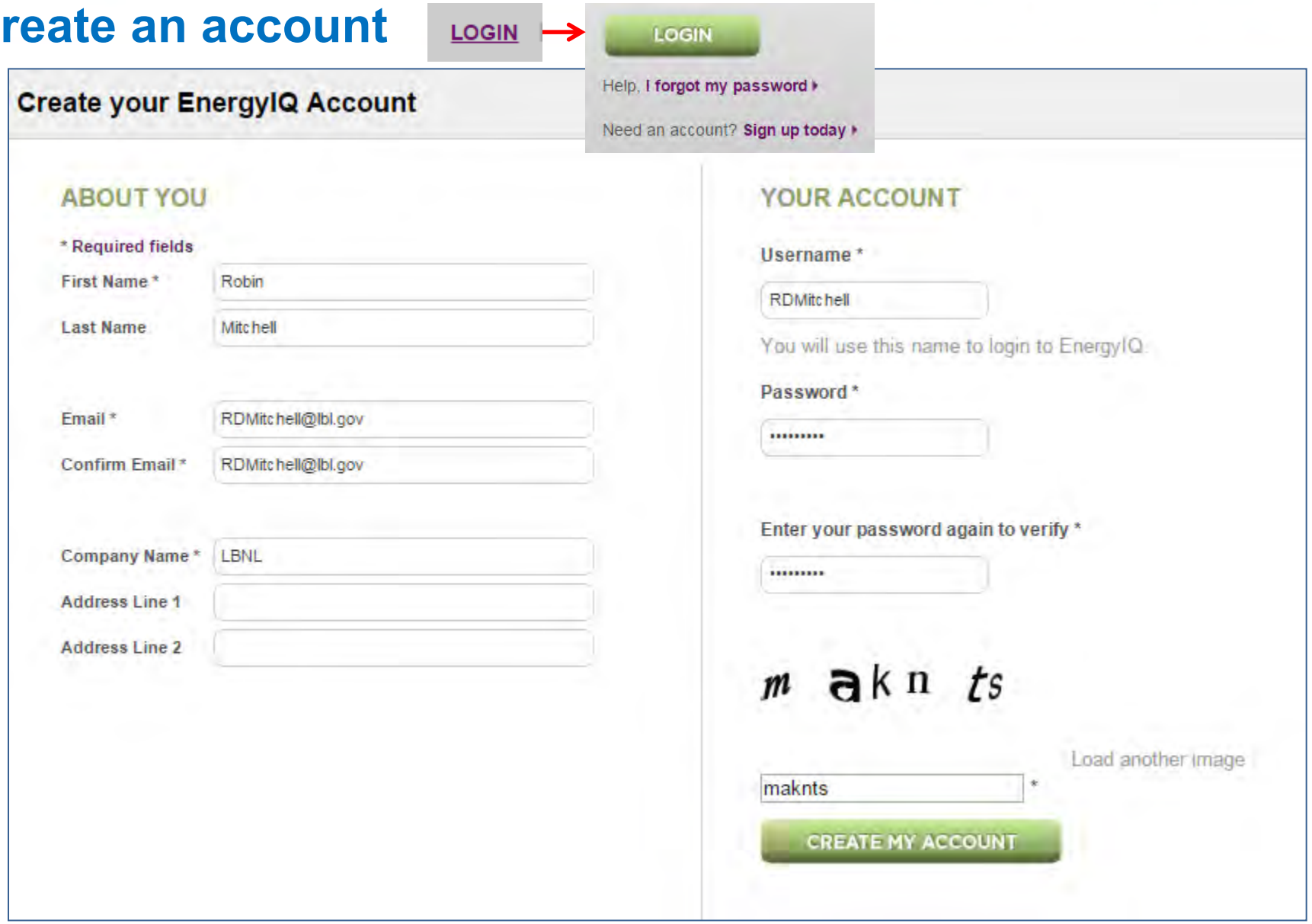
Compare your building to similar buildings

Calculate Energy Use Intensity (EUI)

EnergyIQ

Cost	Free
Format	Online
Features	Benchmarking Limited energy use tracking Can retrieve data from Portfolio Manager
Access	energyiq.lbl.gov/

Create an account



Enter the Building Details

EnergyIQ LOGOUT | MY INFO | ABOUT | HELP | BENCHMARK | TRACK | ACT | MY BUILDINGS

My Buildings ▸ Small-Med Biz TOU Med Use - 2,000 SF

Building Details | Peer Group | Features | Energy Use | Targets

Enter basic information about this building.

Click Save → Save

* Required fields

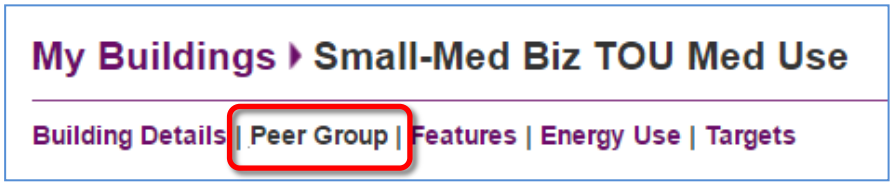
Name of the Building *	Small-Med Biz TOU Med Use - 2,000 SF
Address Line 1	
Address Line 2	
Country *	United States
ZIP *	95330
City	Lathrop
State	CA
Year Constructed *	1960
Year Renovated	
Hours Occupied per Week	60
Building Certification *	Not Certified ENERGY STAR Certified LEED Silver
Building Status*	Existing Building

Occupancy information used to generate multiple metrics for benchmarking purposes.

Total Floor Area *	2000	sq. ft. (all building types)
Employees	15	number (all building types)
Seating †	0	number (food service, public assembly, religious)
Students	0	number (education)
Patient Beds	0	number (hospital, nursing home)
Guest Rooms	0	number (lodging)

† Public assembly and religious facilities not supported in California (CEUS) peer group benchmarking.

Define Peer Group for your building to trigger Actions



Peer Group	California
Floor area	0 – 5,000
Hours of operation	41 – 61
Vintage	1941 - present
Location	Central Valley
Office	All options

Use sliders to set lower and upper bounds

Click Save

Define Building Features

- Single-zone Air Handlers
- Multi-zone Air Handlers
- Chilled Water Chillers
- Chilled Water Pump
- Chilled Water Heat Rejection
- Hot Water/Steam Boiler
- Hot Water/Steam Pumps
- Service Hot Water
- Remote Refrigeration Equipment
- Envelope

My Buildings ▸ **Small-Med Biz TOU Med Use**

Building Details | Peer Group | **Features** | Energy Use | Targets

Customize this form to enable comparisons of this building's features to those in its peer group on the Benchmark and Track tabs, and to obtain custom recommendations for energy upgrades on the ACT tab.

▾ Indoor Lighting

Indoor Lighting

Lamp Type: Incandescent ▾ | Control Type: None ▾ | Ballast Type: Choose one... ▾ | Weekly Hours of Use: 80

Wattage: 75

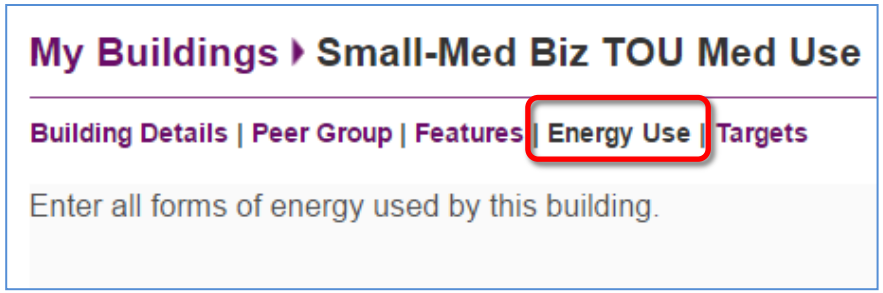
▾ Outdoor Lighting

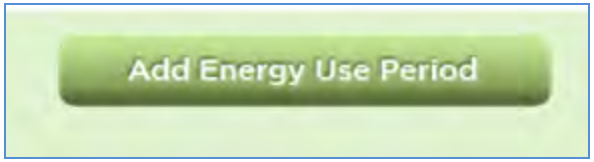
Outdoor Lighting

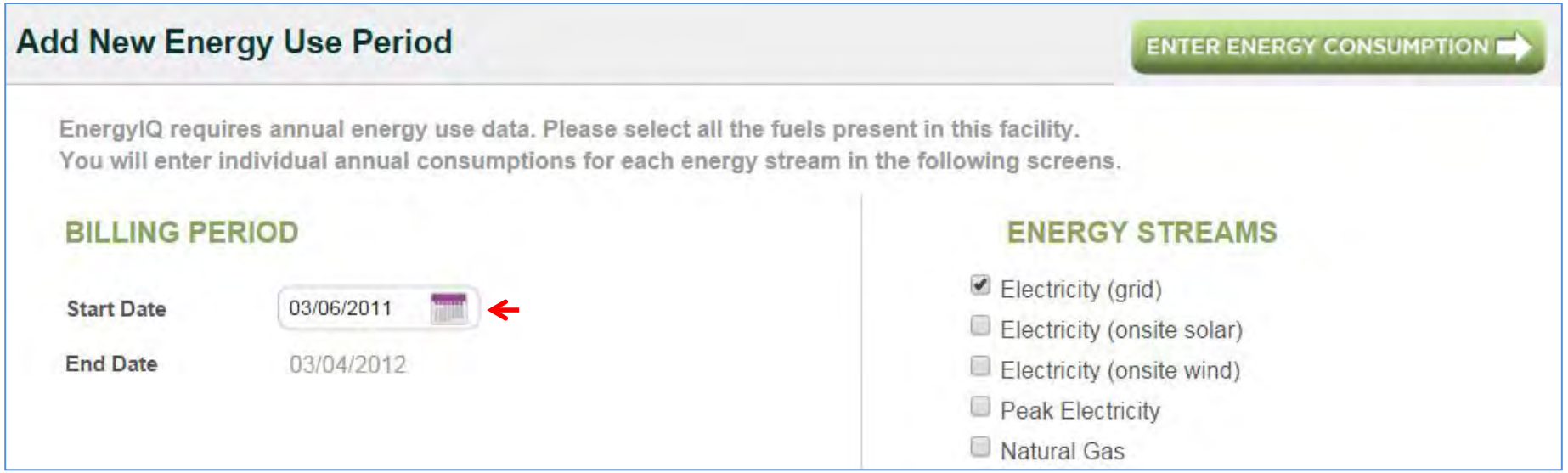
Lamp Type: Mercury Vapo ▾ | Control Type: None ▾ | Ballast Type: Choose one... ▾ | Weekly Hours of Use: 100

Click Save → Save

Add Electricity Consumption







Energy IQ - Benchmarking

Electricity (grid)

SAVE ENERGY USE

You may overwrite default source energy and carbon emission conversion factors that are provided for you.

End use values can be calculated based on buildings in your peer group. Check box(es) to exclude end use(s) that don't apply to your building.

Click Save Energy Use

ENERGY STREAM

* Required fields

Annual Use *	11,247	kWh (thousand Watt-hour)
Annual Cost ($) *	2,024	
Source Energy Factor	3.14	Source/Site
CO_2	388.784	lbs CO2/MBTU
CO_2e	390.8113	lbs CO2e/MBTU

Only need to enter Annual Use and Annual Cost

Can Default all other values

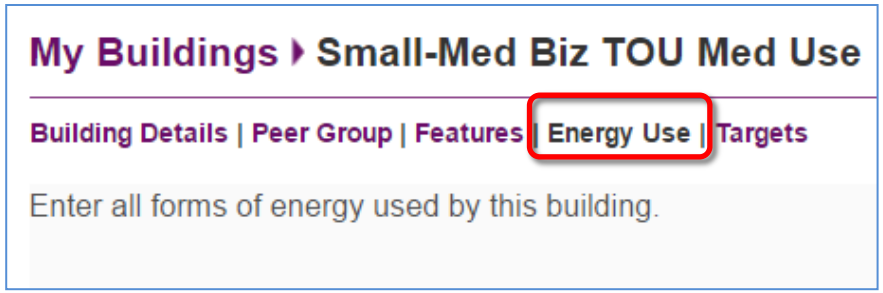
END USE BREAKOUT

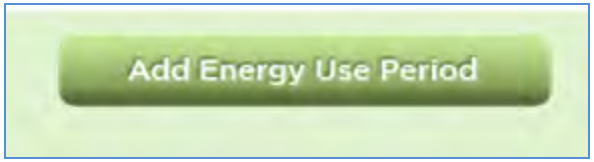
Use Default Values | Reset

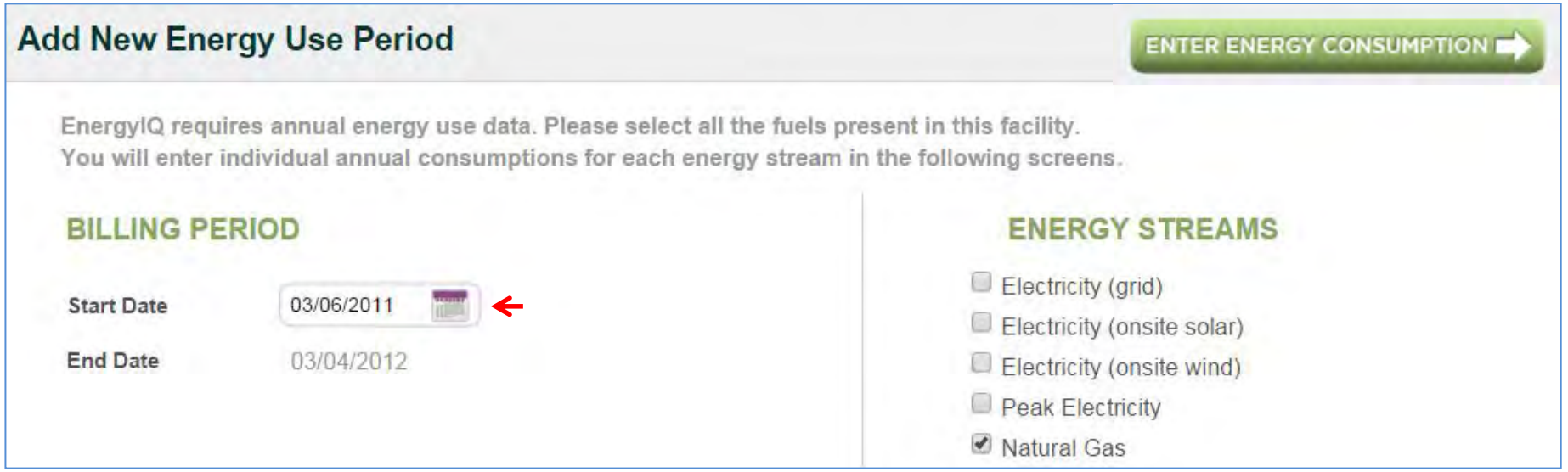
Check box(es) to exclude end-use(s) from total.

Lighting	
Heating	
Cooling	
Ventilation	
Service Hot Water	
Office Equipment	
Refrigeration	
Cooking	
Motors	
Air Compressors	
Process	
Miscellaneous	
Unassigned	11,247

Add Natural Gas Consumption







Energy IQ - Benchmarking

Natural Gas

SAVE ENERGY USE

You may overwrite default source energy and carbon emission conversion factors that are provided for you.

End use values can be calculated based on buildings in your peer group. Check box(es) to exclude end use(s) that don't apply to your building.

Click Save Energy Use

ENERGY STREAM

* Required fields

Annual Use *	200	therms
Annual Cost ($) *	190	

Source Energy Factor	1.05	Source/Site
CO_2	116.72474	lbs CO2/MBTU
CO_2e	117.0400792	lbs CO2e/MBTU

Only need to enter Annual Use and Annual Cost

Can Default all other values

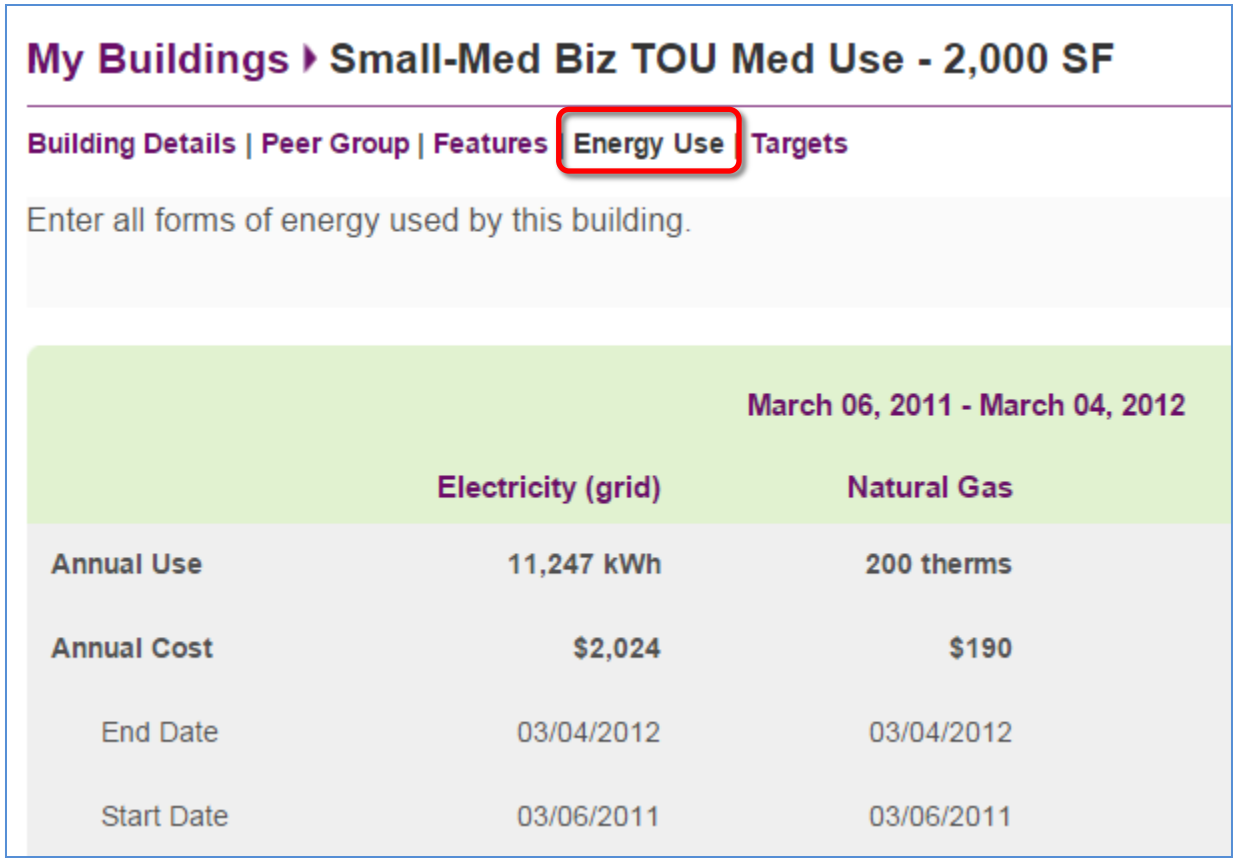
END USE BREAKOUT

Use Default Values | Reset

Check box(es) to exclude end-use(s) from total.

Lighting	
Heating	
Cooling	
Ventilation	
Service Hot Water	
Office Equipment	
Refrigeration	
Cooking	
Motors	
Air Compressors	
Process	
Miscellaneous	
Unassigned	200

Program Summarizes Energy Use



My Buildings ▸ Small-Med Biz TOU Med Use - 2,000 SF

Building Details | Peer Group | Features | Energy Use | Targets

Enter all forms of energy used by this building.

	March 06, 2011 - March 04, 2012	
	Electricity (grid)	Natural Gas
Annual Use	11,247 kWh	200 therms
Annual Cost	$2,024	$190
End Date	03/04/2012	03/04/2012
Start Date	03/06/2011	03/06/2011

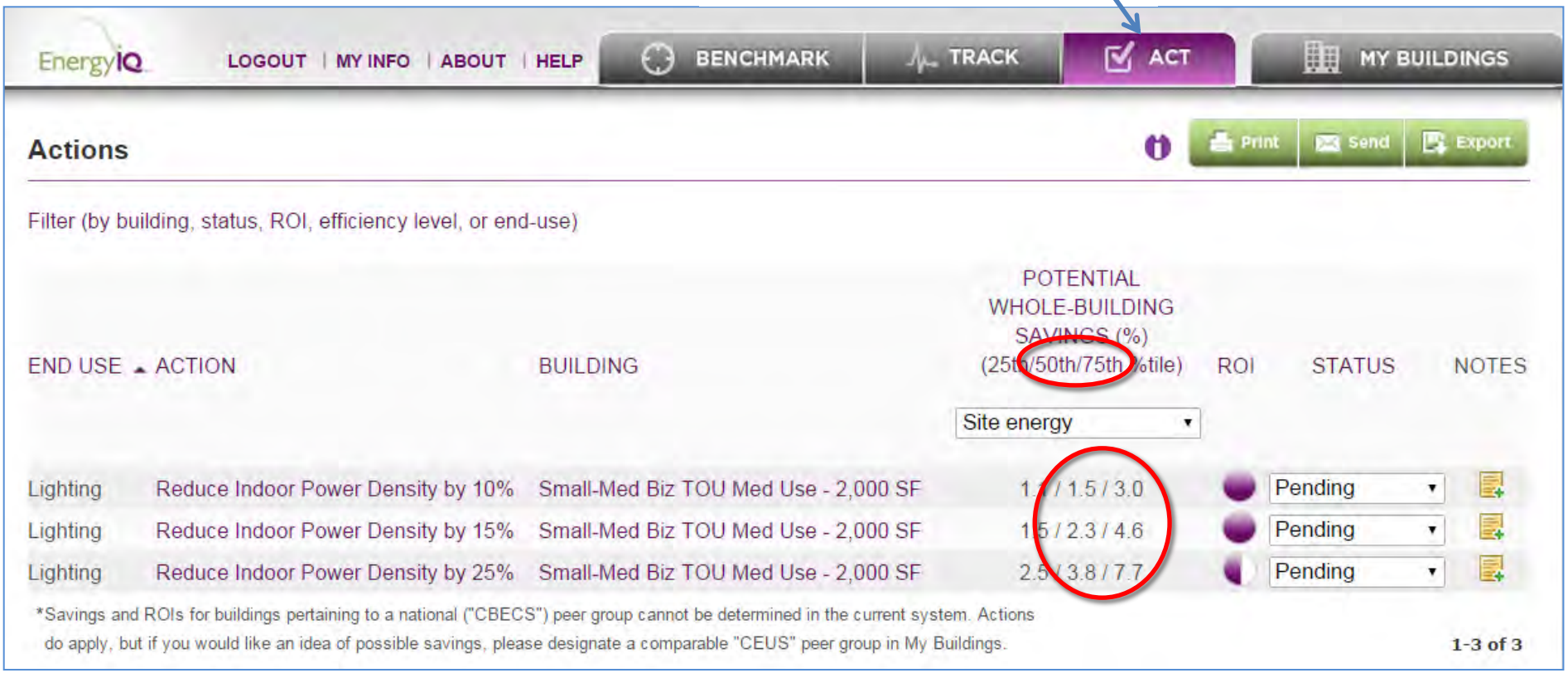
Energy IQ - Benchmarking

POTENTIAL SAVINGS: The savings are derived from computer simulations of each actual building in your peer group (as selected by you on the Benchmark tab). Savings can be show in terms of site energy, source energy, electricity, peak electricity demand, fuel, carbon emissions, or money. The three values shown reflect the range of outcomes for the simulations of your peer-group buildings, i.e., for the 25th, 50th, and 75th percentiles. The savings values are expressed in percentage of whole-building savings. Rigorous savings estimates require an investment-grade energy audit. The sort key for t column is the 50th percentile value.

In some cases, savings can be negative. These can happen where non-HVAC measures influence HVAC energy use. Electric lighting savings, for example, can cause increased gas use for heating (as well as cause increased whole-building electric savings thanks to reduced cooling loads).

ROI: This column provides a rough qualitative sense (low-medium-high) for the return on investment of each measure.

Click ACT to see the Actions



Benchmarking Peer Group

Metrics	Whole Building Total Energy
Normalize by	Floor Area
Peer Group	California/Sample of Buildings
Floor area	0 – 10,000
Hours of operation	41 – 61
Vintage	1941 - present
Location	Central Valley
Office	All options

Benchmarking Peer Group

Filtering Rules: Buildings in California

Benchmark Peer Group: A representative sample of buildings

Energy

Metrics

WHOLE-BUILDING
- Total Energy
- Total Electricity
- Total Fuel
- Peak Electricity Demand

Normalize

NORMALIZE BY
- Floor Area (all building types)
- Employees (all building types)
- Seating (food service)
- Students (education)
- Patient Beds (hospital, nursing home)
- Guest Rooms (Lodging)

DEFINE PEER GROUP

Floor Area

FLOOR AREA
Floor Area (sqft): 0 - 10000

Hours of Operation

HOURS OF OPERATION
Weekly Hours: 41 - 61

Vintage

VINTAGE
- All years
- 1991 - Present
- 1979 - 1990
- 1941 - 1978
- 1901 - 1940
- Pre-1900
- Unknown

Location

LOCATION [MAP]
- All Locations
- Central Coast
- Central Valley
- Desert
- Mountains
- North Coast
- South Coast
- South Inland
- Unknown

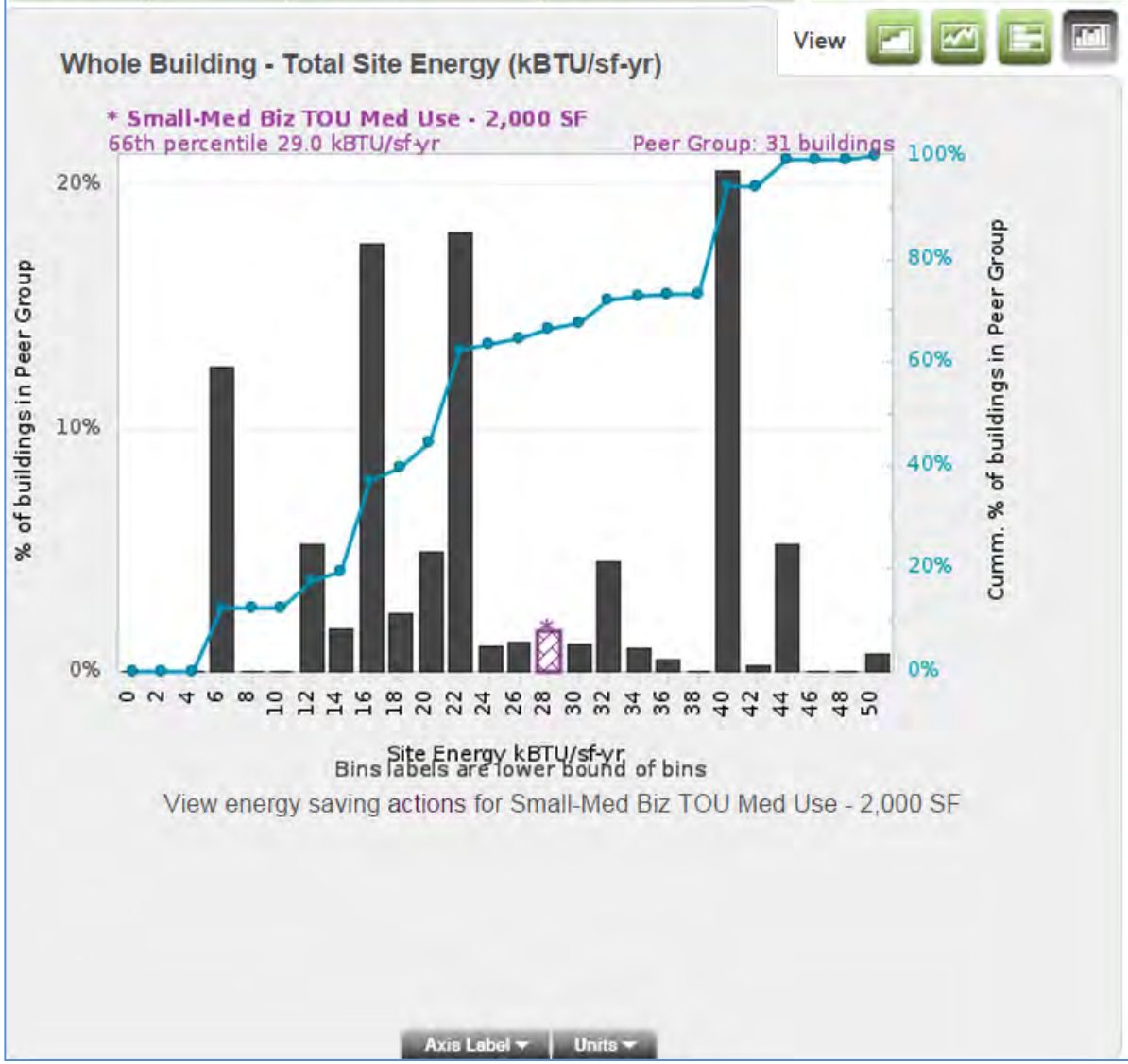
OFFICE
- Administration and Management
- Financial/Legal
- Insurance/Real Estate
- Government Services
- Software Development
- Medical/Dental Office
- Assorted/Multi-tenant
- Other Office

DRAW CHART

Energy IQ - Benchmarking

Export | Email | Add to Dashboard | Create New Chart | Remove Building

View



View energy saving actions for Small-Med Biz TOU Med Use - 2,000 SF

Peer Group Information

SUMMARY The Site Energy for typical buildings of the type(s) you've specified is 22.3 kBTU/sf-yr [median value], with a range of 6.3 to 43.2 kBTU/sf-yr [5th to 95th percentiles] for the population. Select "Add a Building" button to see how yours compares. Try other Views for graphical and tabular detail. This analysis includes population weights for each building.

DATA SET California only (CEUS)

LOCATION California= Central Valley

SIZE 0 - 10000 sqft

HOURS OF OPERATION 41 - 61 hours/week

VINTAGE 1941 through 1978, 1979 through 1990, 1991 through Present

TYPE Administration and Management, Assorted/Multi-tenant, Financial/Legal, Government Services, Insurance/Real Estate, Medical/Dental Office, Other Office, Software Development

Element 1, Page 11, Step 4

STEP 4 Cross-sectional Benchmarking

Energy Use Intensity (EUI): 29.0 kBtu/sf-yr (include units, ideally kBTU/sf-yr)

EUI is total annual energy use per unit floor area.

Comparison % ranking: 34 (% of buildings with higher EUI (worse performance) than yours)

Note that in some tools, percentile is defined in the opposite way. 66% Percentile in EnergyIQ

Is this an Energy Star Rating? yes (no) **Peer group used** (if available): Office, < 10,000 sf, Central Valley

If Energy Star Rating is 75 or higher, the building may be eligible for an Energy Star Label.

Other peer comparison: *Example: Your building's EUI is 40 kBTU/sf-yr and the average for similar buildings is 55 kBTU/sf-yr.*

This building EUI = 29.0 kBtu/sf, mean = 22.3 kBtu/sf, range = 6.3 to 43.2 kBtu/sf

Are there special considerations that might cause your building to differ from the defined peer group?

Building Energy Fingerprint

Cost	Free
Format	Online
Features	Green Button data analysis (**electricity only**) (download data from utility in XML format)
Access	fingerprint.lbl.gov/

From Website:

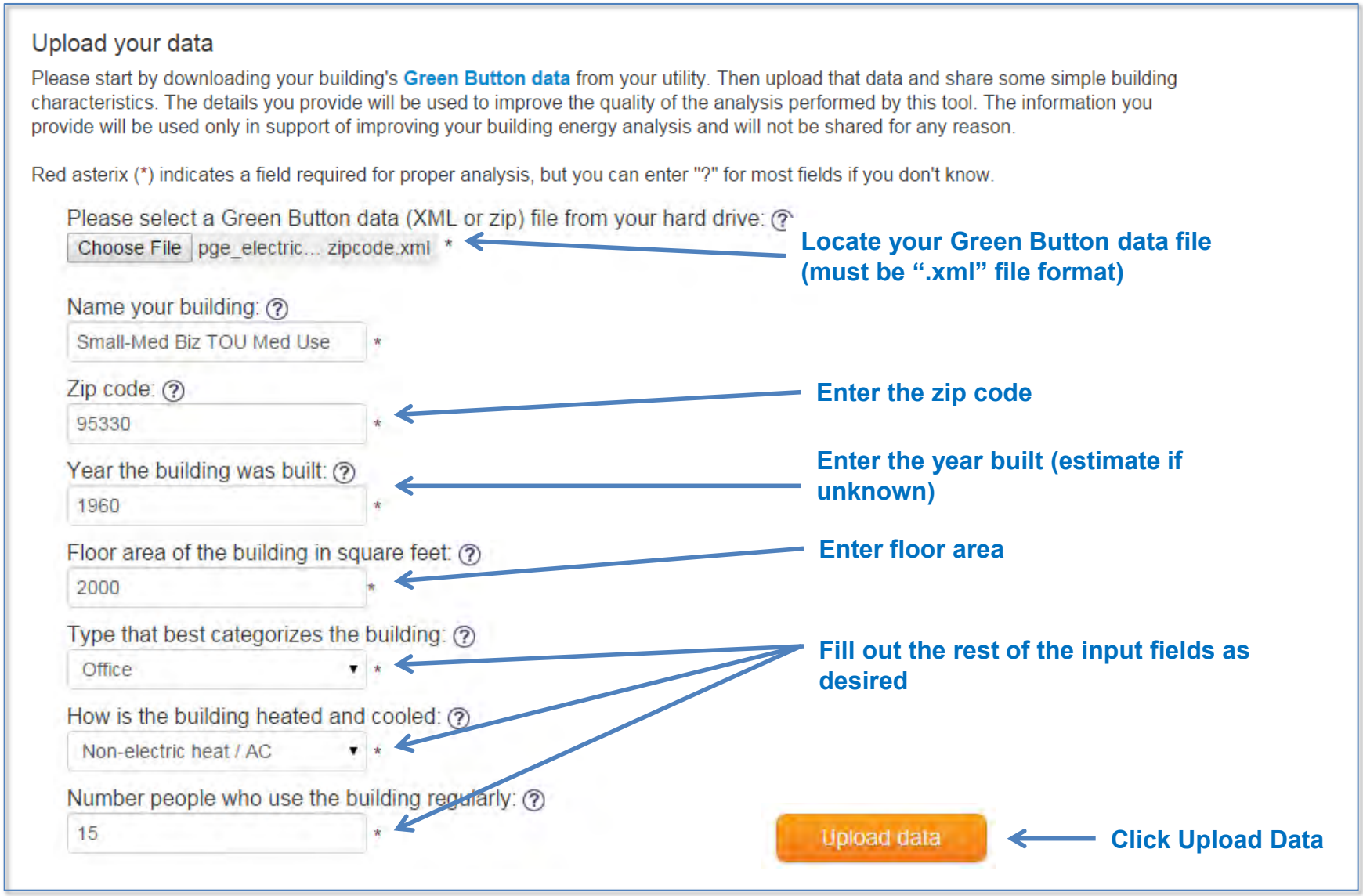
https://sites.google.com/a/lbl.gov/emp/documents

Pacific Energy Center Training, November 13, 2014

- Presentation (PDF)
- Business Model (PDF)
- Sample Interval Data file (XML)
- Sample Building Description (PDF)

pge_electric_interval_data_2011-03-06_to_2012-04-06 A6 Small-Med Business Time of Use Medium Usage zipcode.xml

Log on to the website and fill in the input on the webform



A Summary of the building input is displayed

File details:
Name: Small Biz TOU zip
Building type: Office
Zip code: 95330
Weather station: STOCKTON METROPOLITAN AIRPORT (9.6 km away)
Floor area: 25000 sqft
Occupant count: 150
Year built: 1960
Heating/cooling: Non-electric heat / AC
File: pge_electric_interval_data_2011-03-06_to_2012-04-06 A6 Small-Med Business Time of Use Medium Usage zipcode.xml
Size: 7772471 bites
Content type: text/xml

It can take a bit of time after you click on Upload Data for the program to get to this screen

Success!

The upload and validation of your data was successful. View a **customized report** based on your data in pdf format.

Get your report | Download to Excel | Provide feedback on this tool

Click "Get your report"

Building Fingerprint

A Summary of the building input is displayed

Get your report →

Multi-page PDF report is generated

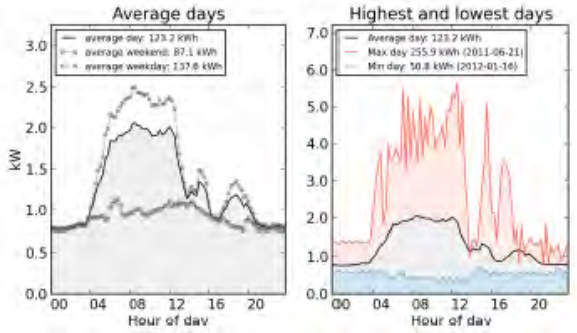
Building Energy Fingerprint

Green Button data analysis

Building fingerprinting report for 'Small-Med Biz TOU Med Use'

	pge_electric_interval_data_2011-03-06_to_2012-04-06 A6 Small-Med Business Time of Use Medium		
File name:	Usage zipcode.xml	**Building type:**	Office
Upload time:	11-11-2014 08:10 PM	**Floor area:**	2000 sqft (15 occupants)
Size:	7772471 bytes	**Year built:**	1960
Content type:	text/xml	**Zip code:**	95330
First reading:	03-06-2011 12:00 AM	**Heating/cooling:**	Non-electric heat / AC
Last reading:	04-04-2012 12:00 AM	**Weather station:**	STOCKTON METROPOLITAN AIRPORT (9.6 km away)

Metric	Value	Per sqft	Per occupant
Average daily min (W): This is the amount of power that the building typically uses at the lowest consumption time of day. Minimum usage is mostly driven by loads that run all the time, like refrigerators, ventilation, hallway lighting, and computers and other "vampire loads" from appliances and electronics that stay plugged in.	618	0.31	41
Average daily max (W): This is the amount of power that the building typically uses at the highest consumption time of day. The daily maximum could be dominated by a single large load, or could be the sum of several little ones, such as AC, TV, and various appliances.	2417	1.21	161
Average daily range (W): This is the difference between the average daily max and average daily min. It provides a rough estimate of the total load turned on and off every day.	1799	0.90	120
Average daily max/min ratio: Low values indicate that a greater proportion of items are being left on continuously. Values over 3 indicate significant loads are shut off for parts of the day. While this may indicate good control, it could also indicate excessive peak usage. To save energy, look to extend and deepen shutoff periods while also reducing peak usage.	4.0	NA	NA
Annual consumption (kWh): This is the annual electricity demand based on your data (projected if necessary). Annual kWh and annual kWh per sqft (also known as Energy Use Intensity) values are calculated nationally for residential and commercial buildings.	11247	5.62	750



Building Fingerprint

Building fingerprinting report for 'Small-Med Biz TOU Med Use'

	pge_electric_interval_data_2011-03-06_to_2012-04-06 A6 Small-Med Business Time of Use Medium		
File name:	Usage zipcode.xml	**Building type:**	Office
Upload time:	11-11-2014 08:10 PM	**Floor area:**	2000 sqft (15 occupants)
Size:	7772471 bytes	**Year built:**	1960
Content type:	text/xml	**Zip code:**	95330
First reading:	03-06-2011 12:00 AM	**Heating/cooling:**	Non-electric heat / AC
Last reading:	04-04-2012 12:00 AM	**Weather station:**	STOCKTON METROPOLITAN AIRPORT (9.6 km away)

Metric	Value	Per sqft	Per occupant
Average daily min (W): This is the amount of power that the building typically uses at the lowest consumption time of day. Minimum usage is mostly driven by loads that run all the time, like refrigerators, ventilation, hallway lighting, and computers and other "vampire loads" from appliances and electronics that stay plugged in.	618	0.31	41
Average daily max (W): This is the amount of power that the building typically uses at the highest consumption time of day. The daily maximum could be dominated by a single large load, or could be the sum of several little ones, such as AC, TV, and various appliances.	2417	1.21	161
Average daily range (W): This is the difference between the average daily max and average daily min. It provides a rough estimate of the total load turned on and off every day.	1799	0.90	120
Average daily max/min ratio: Low values indicate that a greater proportion of items are being left on continuously. Values over 3 indicate significant loads are shut off for parts of the day. While this may indicate good control, it could also indicate excessive peak usage. To save energy, look to extend and deepen shutoff periods while also reducing peak usage.	4.0	NA	NA
Annual consumption (kWh): This is the annual electricity demand based on your data (projected if necessary). Annual kWh and annual kWh per sqft (also known as Energy Use Intensity) values are calculated nationally for residential and commercial buildings.	11247	5.62	750

Building Fingerprint

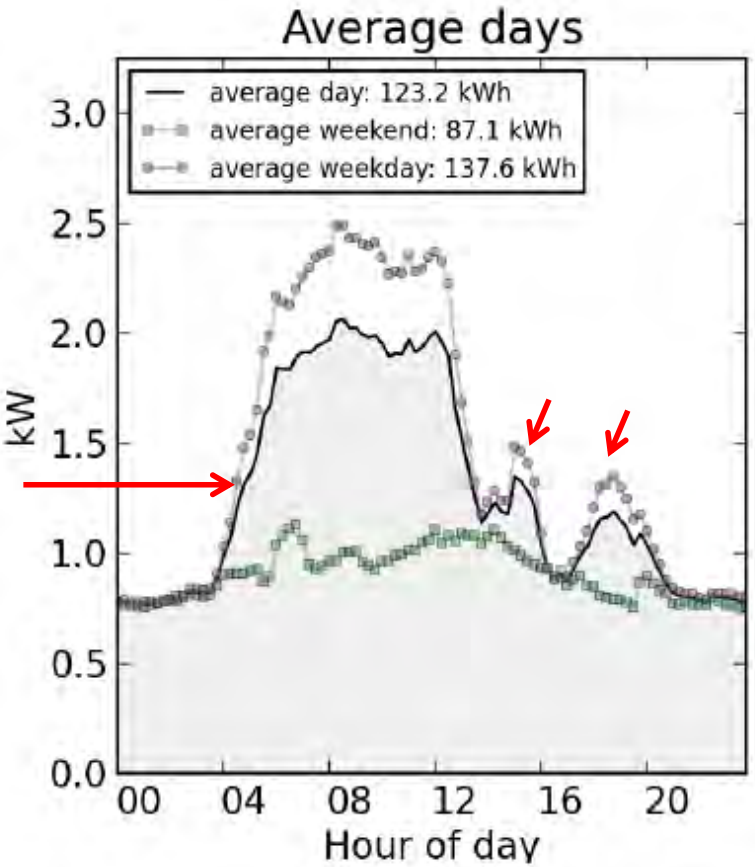
Daily Graphs:

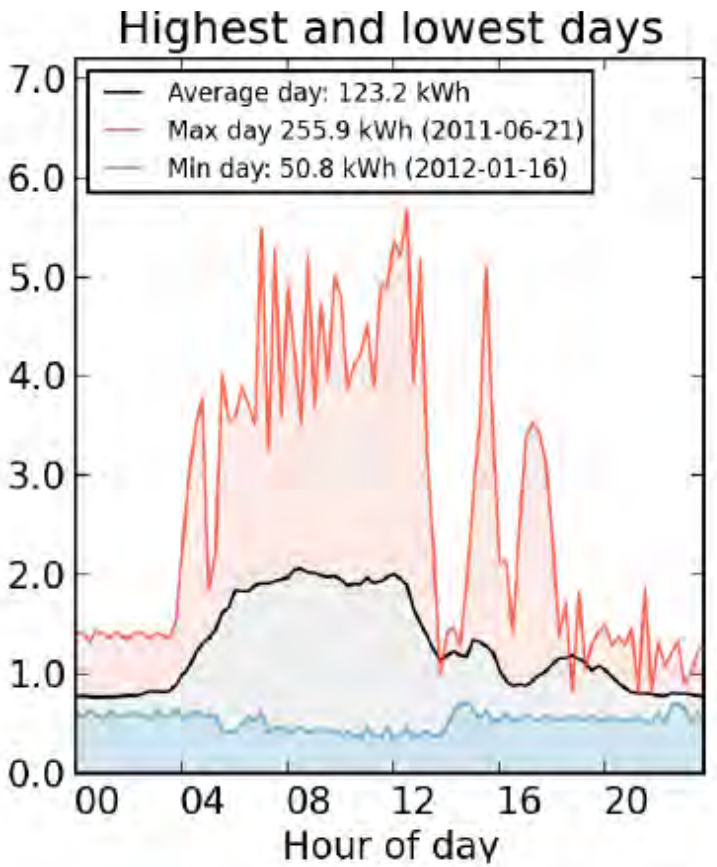
- Average consumption
- Highest consumption (June 21)
- Lowest consumption (January 16)

Review:

- Daily Load Profile Shape
- Morning Start up / Evening Shut down
- Average, Highest and Lowest daily consumption

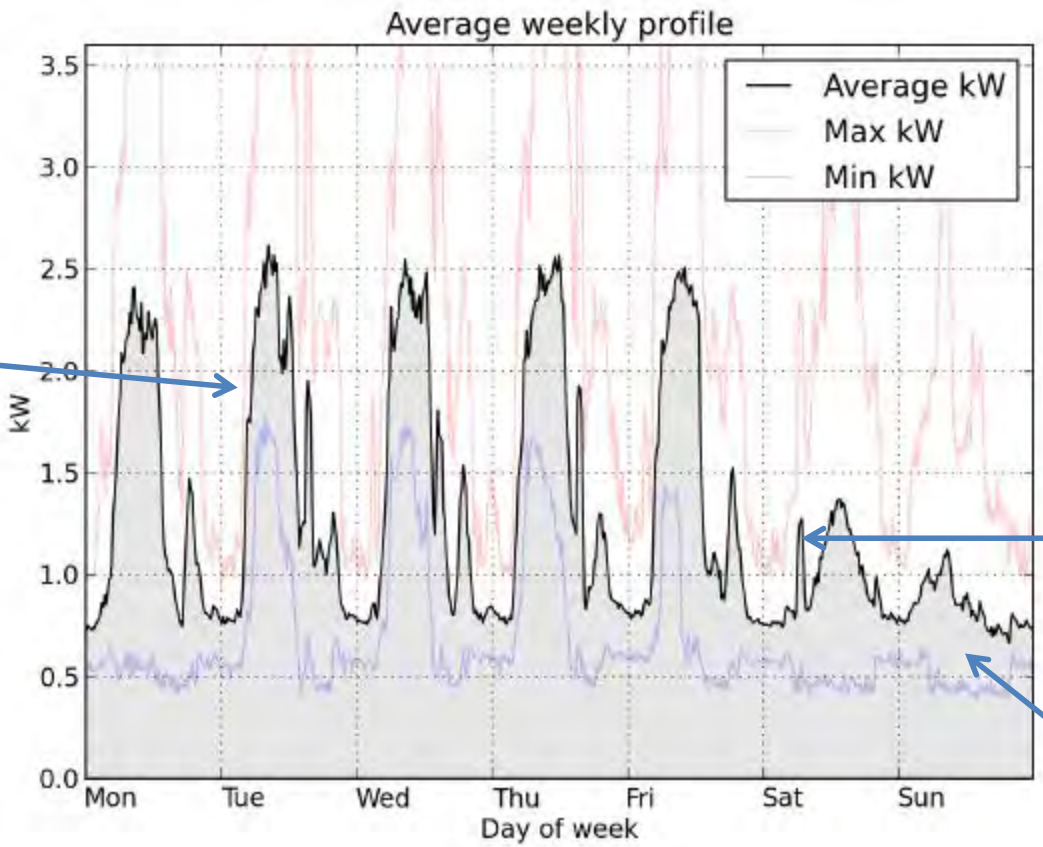
Morning Startup





Typical Weekly Profile

Review:
- Weekday vs weekend shape
- Base Load



Consumption is consistent during the week

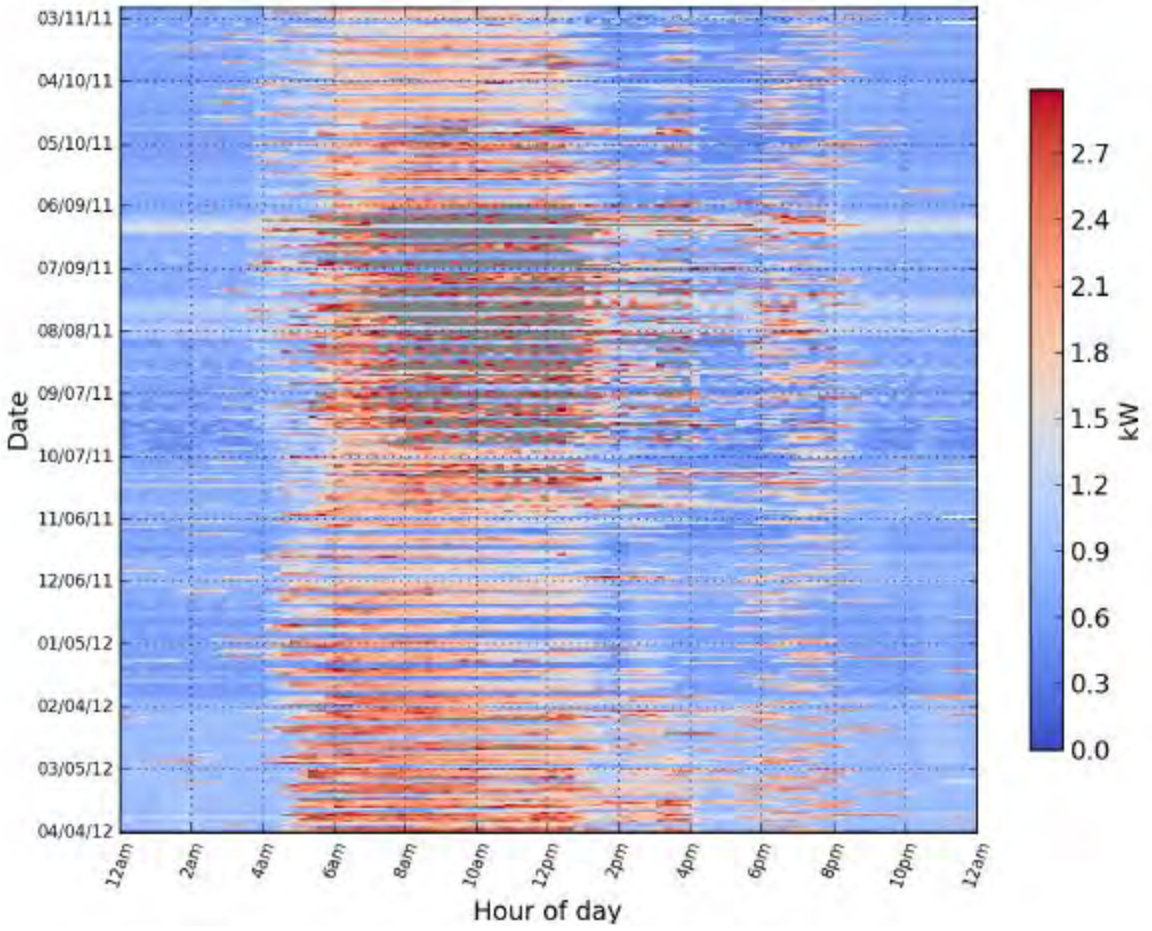
Base Load
Can this be reduced?

What is this spike on Saturday?

Weekend
- **Low on Sat**
- **Lowest on Sun**

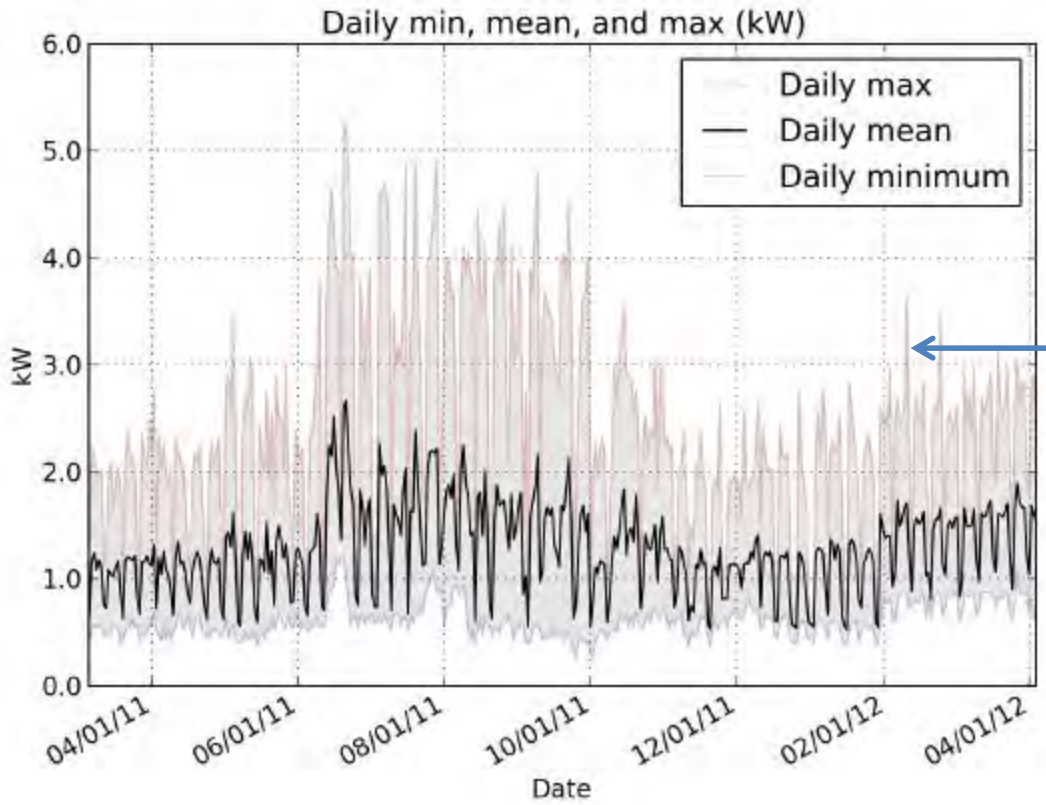
Power Heat Map

This chart color codes the energy consumption for every meter reading.



Daily Mean & Extremes

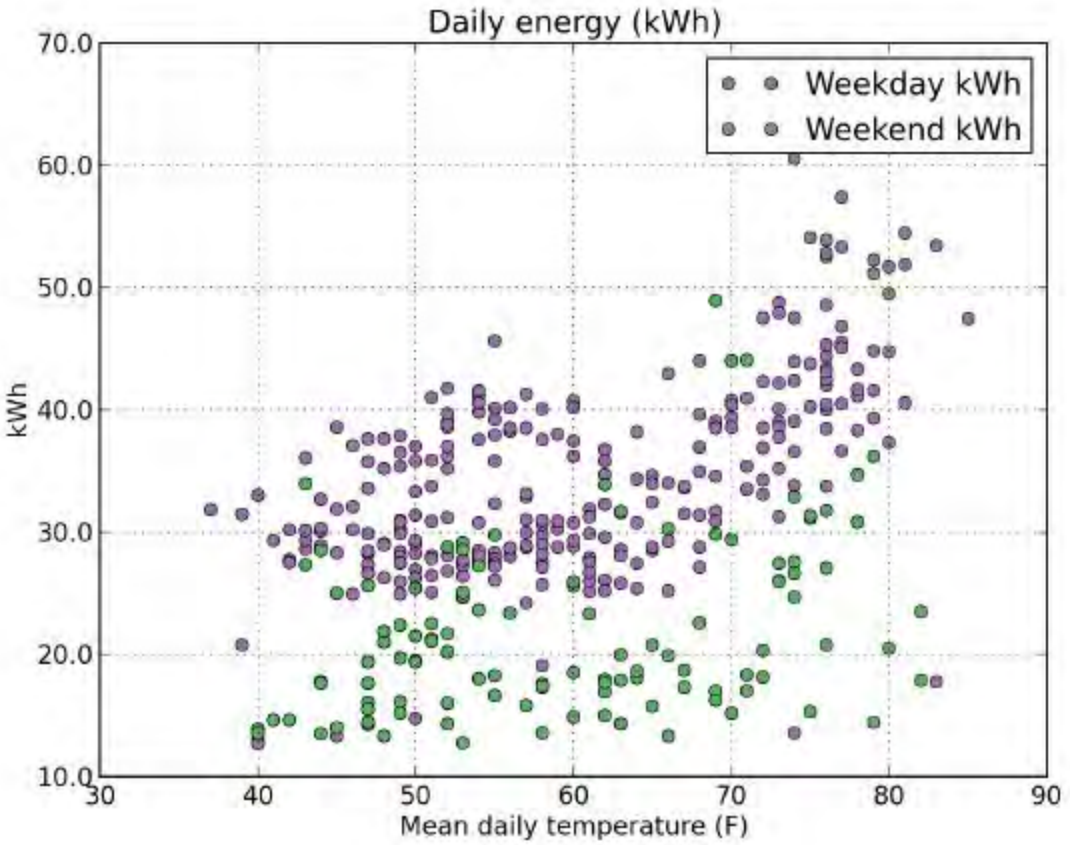
This chart shows the seasonal variations in daily mean, maximum and minimum.



Spikes in early spring

Thermal Response

Analyze the relationship of power intensity to outdoor temperature.



Consumption is tied to outside temperature.

Element 2, Page 16, Step 2

STEP 2 Daily and Weekly Scheduling:

☐ Printed a plot of a week or several weeks of daily loads

Weekly pattern (circle): Weekend load compared w/ typical: As owner expected?	all days similar weekday/weekend weekday/Sat/Sun irregular/other: _____ same slightly lower much lower base load level yes / no
Holiday loads compared w/ typical: Which holidays (circle): As owner expected?	same slightly lower much lower base load level 1/1 MLK Pres. Mem. July4 Labor Colum. Vet. ThnksGiv 12/24 12/25 other:_____ yes / no
Typical day scheduling: As owner expected?	Startup begins: 4 am Startup ends: 6 am Shutdown begins:_____ Shutdown ends:_____ yes / no
Notes on irregular activity: *Include times where equipment may be running unnecessarily.*	

Element 2, Page 16-17, Step 3-4

STEP 3 Base Load:

Base load level: 0.5 kW Typical daily maximum level 2.5 kW
Base load to daily maximum ratio: 0.2 kW *Divide base load by typical daily max*
• *If ratio above is greater than 0.50, look for opportunities to deepen setbacks.*

STEP 4 Load Spikes and Unusual Activity

Date & Time	**Description** *(ex: 100kWh spike above typical load)*	**Explanation** *(consult with owner/occupants)*	**Plan to address?** (check if yes)
2/15	1 kW spike above typical		

STEP 5 Peak Loads

Time of day pricing? yes / no Demand charges? yes / no *Utility bill should include this information.*
Time of peak: 1 pm Size of peak (kW): 5.5 kW Peak load per floor area: 2.75 W/sf
• *If time of peak is between 2 and 6 pm and time of day pricing is applied, consider shifting scheduling to off-peak hours.* • *If demand charges are applied, consider shifting equipment scheduling to reduce peak level.* • *If peak load per floor area is greater than 6 W/sf for office, retail or food sales or 9 W/sf for food service, look for opportunities to reduce peak level.*

Summary Generator

Spreadsheet

Spreadsheet can be downloaded from website

https://sites.google.com/a/lbl.gov/emp/documents

Package Materials

Energy Management Package (PDF) 	Business Model Document (PDF) 	Introductory Webinar 
Summary Generator (XLSX) For general use 	Summary Generator (XLSX) Unlocked for editing 	Element 3 Walkthrough Checklist (PDF) Also in Complete Package doc 

Download Spreadsheet

Enter Information

First: **Enter inputs**

Shading indicates an input is needed

Site information			
Building name or Address	Delightful Dentistry, 52 Main St.		
Your company name	Got your back HVAC		
Current status:			
Building type:	food service		
Floor area:	2,000	square feet	
EUI:	500	kBTU / sq ft - yr	
What is your building's % ranking (equivalent to Energy Star Score)?			
% ranking :	Estimate this for me based on EUI		
% rank estimate:	27	% of buildings have higher energy use intensity (Energy Star Score)	
Comparison with previous year:			
Previous year EUI:	527	kBTU / sq ft - yr	(leave blank if unknown)
If you don't know previous year's exact EUI(above):			
Energy usage has	decreased	compared with the previous year	
Energy savings goal for upcoming year:			
Savings goal:	5	%	Typically 3-10% is reasonable--see Guidelines Step 3
What does this facility sell (e.x. hamburgers, dental cleanings, pairs of shoes, etc) ?			
item sold	dental cleanings		
profit per item	$ 5		
This is equivalent to selling 164 more dental cleanings per year!		**Include this comparison?**	Yes

Enter Recommendations

Second: Select Recommendations

Tick the boxes for the items you want to

A basic measure of how difficult this measure is to implement. You can edit these cells.

Edit these cells to list who would complete the recommended action item.

If an incentive is available, make sure to mark 'Yes' in this column. Rows with shaded box are most likely to have incentives available.

For more information

If relevant for your building, make sure to include these priority elements.

# of actions: 7

Include?	Recommendations	Ease?	Who?	Cost	Incentive?	Element or Walkthrough Q number	Priority
☑	**Train employees in energy conservation**	**Easy**	**Owner**	**$**		**Q1**	➢
☑	**Keep doors/windows closed during cooling and heating season**	**Easy**	**Owner**	**$**		**Q2**	➢
☑	**Switch off computers and monitors at night**	**Easy**	**Owner**	**$**		**Q3**	➢
☐	Switch off vending machines or set to sleep during off-times	Medium	Owner or Contractor	$$		Q4	
☐	Replace incandescent lamps with fluorescents	Easy	Owner	$$		Q5	➢
☑	**Replace T12 lamps with efficient T8 lamps**	**Medium**	**Lighting Contractor**	**$$**		**Q5**	➢
☑	**Install occupancy sensors or time clocks for lighting control**	**Difficult**	**Lighting Contractor**	**$$$**		**Q6**	➢
☐	Configure lighting control devices	Medium	Owner or Contractor	$		Q6	
☐	Program thermostats	Medium	Owner or Contractor	$		Q8 a-e	➢
☐	Adjust thermostat schedule	Medium	Owner or Contractor	$		Q8a	➢
☑	**Adjust thermostat setpoints**	**Medium**	**Owner or Contractor**	**$**		**Q8 b-e**	➢
☐	Add holidays to thermostat program	Medium	Owner or Contractor	$		E2 Step 2	
☐	Minimize widespread space heater use by adjusting zone heating setpoint	Medium	Owner or Contractor	$		Q9	
☐	Clear radiators and air vents from obstructions	Easy	Owner	$		Q10	
☐	Switch off copiers, printers, etc at night	Easy	Owner	$		Q12	➢

Print Report

How is your building performing?

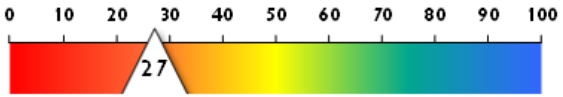
Prepared for Delightful Dentistry, 52 Main St. by Got your back HVAC

Your building uses 500 kBTU/sf per year, which is more efficient than 27% of food service buildings.

Your building's energy use has decreased by 5%, compared with the previous year.

Based on your percentile ranking, there are likely many low-cost opportunities to improve the energy efficiency of this facility.

By reducing your building's energy use by 5%, you could save $820 annually, based on national average energy costs. This is equivalent to selling 164 more dental cleanings per year! This program aims to use low-cost measures to reduce energy use by 3-5%, but higher savings can be achieved by completing many recommendations or additional measures with higher upfront costs.



Knowing is half the battle. But what's the other half? The following table includes low-cost opportunities to reduce your building's energy costs. The more items you choose to implement, the more energy you are likely to save. Additionally, regular energy monitoring is recommended to maintain the energy savings that you achieve.

Recommendations	How easy is this?	Who?	Cost	Incentive?	Date Completed
Train employees in energy conservation	**Easy**	**Owner**	**$**		
Keep doors/windows closed during cooling and heating season	**Easy**	**Owner**	**$**		
Switch off computers and monitors at night	**Easy**	**Owner**	**$**		
Replace T12 lamps with efficient T8 lamps	**Medium**	**Lighting Contractor**	**$$**		
Install occupancy sensors or time clocks for lighting control	**Difficult**	**Lighting Contractor**	**$$$**		
Adjust thermostat setpoints	**Medium**	**Owner or Contractor**	**$**		
Investigate increasing energy usage over time	**Medium**	**Contractor and owner**	**$$**		

Agenda

1. Background
2. Introduction to the Energy Management Package
3. Short Q&A
4. Guidance on accessing data, tools and package
5. Data analysis exercise
6. Overview of business model and value proposition
7. Maximizing Success, Lessons Learned

Market Potential and Business Plan

Why would a **contractor** participate?

- Differentiate your company
- Offer added value to customers through savings
- Identify additional service opportunities
- Gain credibility through third-party programs

Why would a **customer** participate?

- Reduce costs
- Reduce hassle / maintenance
- Improve indoor environmental quality
- Reduce environmental impacts

Market Potential and Business Plan

What is the energy and cost savings potential?

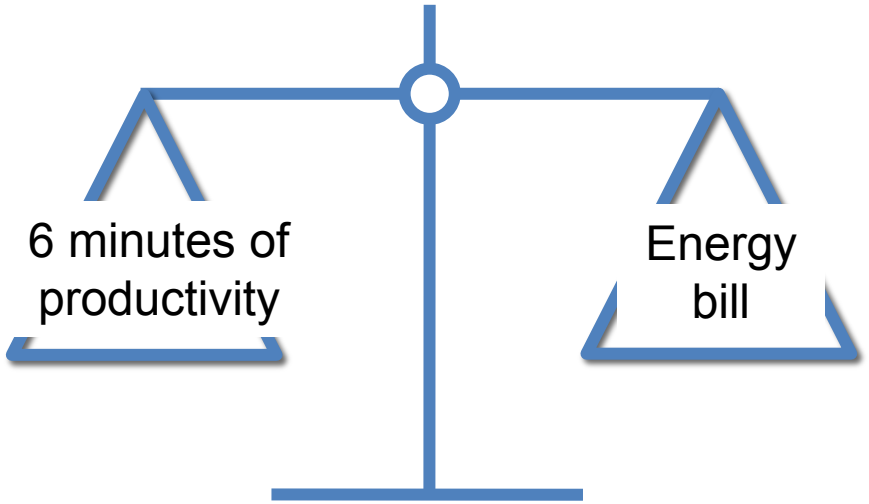
- 5% savings (based on building commissioning results of Mills 2009)
- Median savings of $200-900
- 10% with highest energy use: savings of $1300-2300

Based on total annual fuel expenditure for buildings <50k sf (CBECS, 2003)

Market Potential and Business Plan

Non-energy benefits, such as improved thermal comfort, can be significant.

Salary costs are 100 times energy costs in an office.



Based on average annual expenditures (Romm & Browning 1998)

Market Potential and Business Plan

How would the package be financed?

- Embed costs into maintenance contracts

"Rather than charging $1500/yr, I would charge $1700 or $1750, and incorporate this into what I would offer them…. you're adding value in the maintenance spiel and can monitor usage"
– contractor interviewee

Option 1: Integrate into Service Contract

For the Contractor:

10-15% Premium on Service contract **$100-300/yr** + Attracts or retains an additional customer: **$100-600/yr** + Profit from upgrades performed **$0-100** − Labor cost: 8 hr per yr **$400-500/yr** = Net profit: **$100-300/yr** per customer in program

For the Customer:

Estimated utility savings **$200-900/yr** − Cost of any upgrades **$0-300** − Additional cost of service contract **$100-300/yr** = Annual savings: **up to ~$550/yr**

Agenda

1. Background
2. Introduction to the Energy Management Package
3. Short Q&A
4. Guidance on accessing data, tools and package
5. Data analysis exercise
6. Overview of business model and value proposition
7. Maximizing Success, Lessons Learned

Demonstration Project

Image: Demonstration Sites

- Demonstration was designed to refine business model of the package
- 16 Partner contractors nationwide
- 24 sites for the demonstration
- 400000+ sqf of space

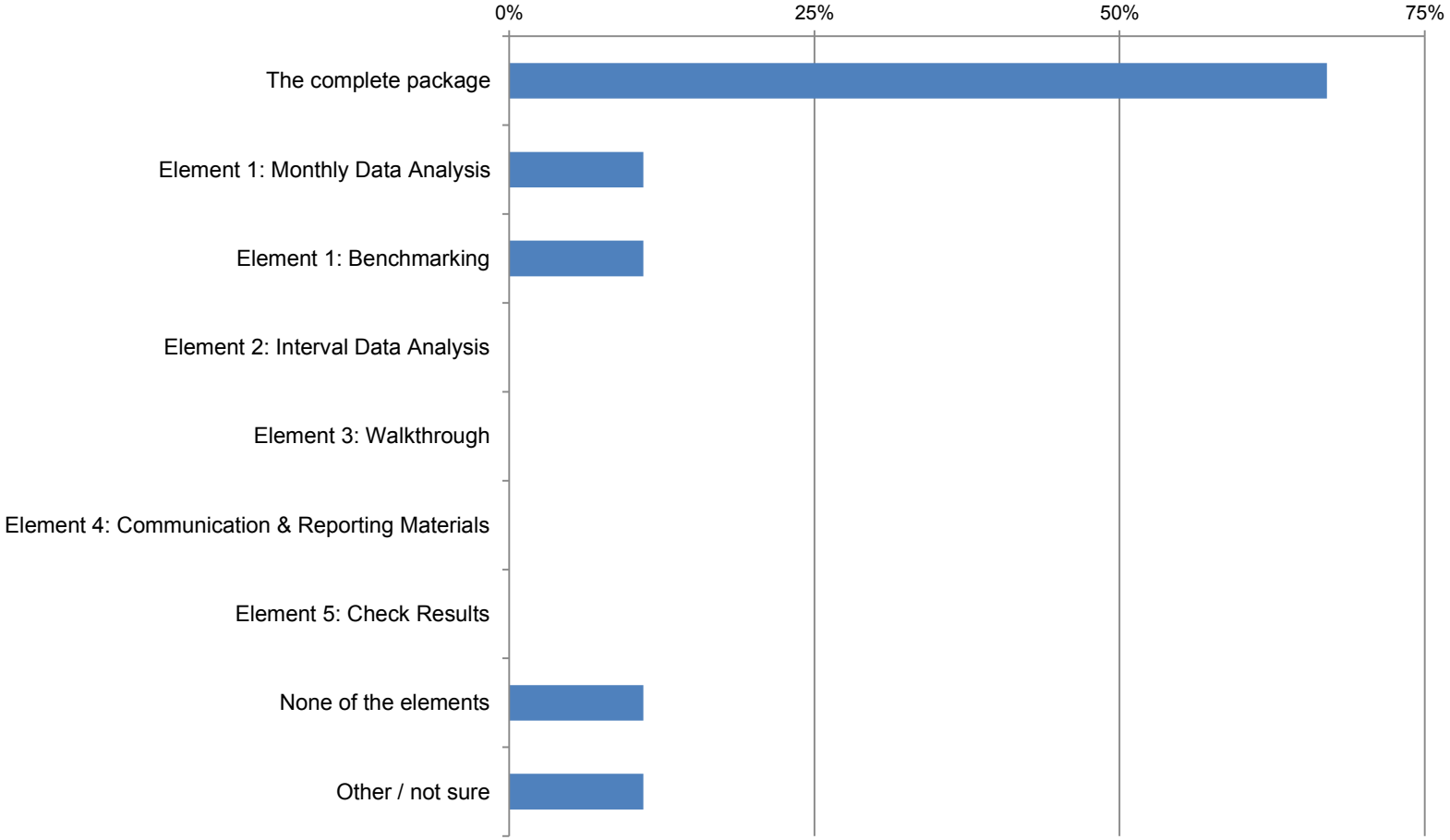
Pilot Demonstration Project

Lessons Learned

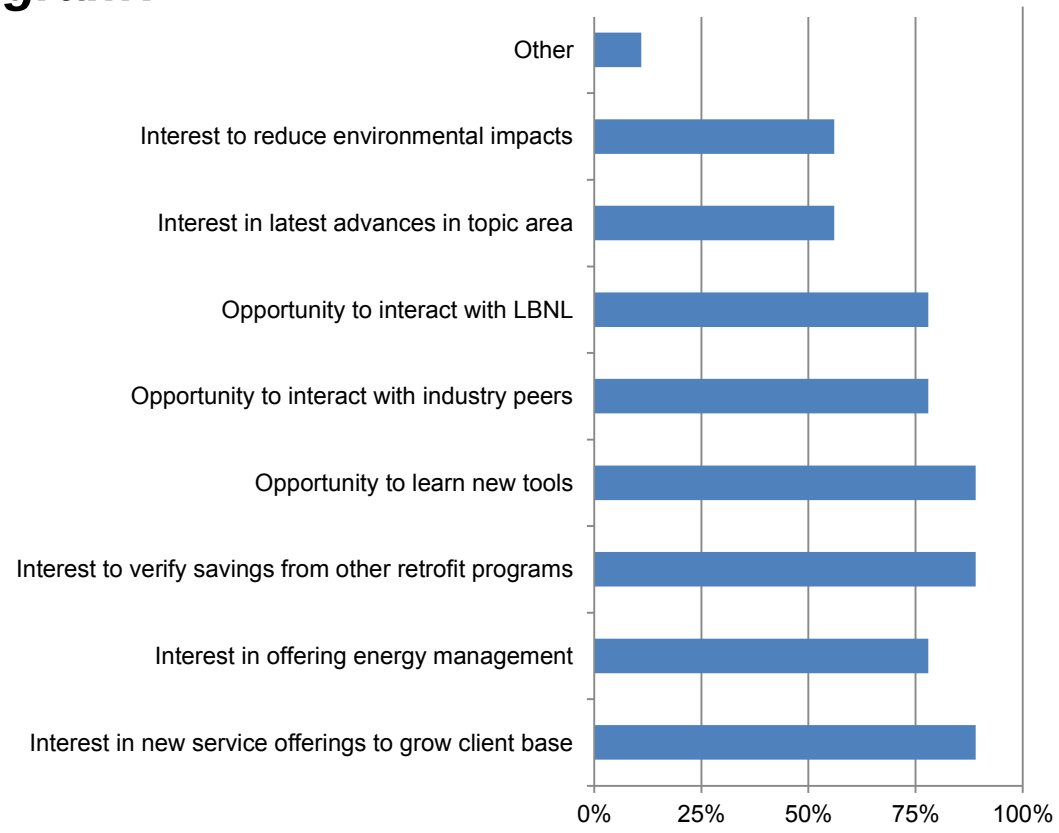
- Estimates of time taken and anticipated savings were validated
- Approach is better suited for owner-occupied buildings
  - Tenanted spaces have split incentives, more actors involved
- The level of technical skills of contractors varies
  - Minimize the number of tools required
  - Automated data access is critical
- Given the initiative and time required to learn new tools, incorporating package instruction into a formal training venue would be beneficial
- Interval data engages both contractors & building staff to understand energy use patterns

Lessons Learned : Survey Results

Which components do you plan to to offer in the future?



What initially attracted you to participate in this program?



Lessons Learned : Partner Feedback

"I think for me a lot of [the EMP] dovetails with things that I have been doing with benchmarking and monthly utility bill analysis but it formalizes it, and puts it all together in one place. It has a nice flow to it, it's putting a lot of resources together in one place, and then brings in the interval data analysis piece which wasn't always top of mind. … So this is definitely something that I will continue to be interested in and continue to use."

- Demonstration Partner Contractor

"We've picked up two new accounts because I was able to say, you know why don't you let me take a look at your energy usage and now we're working on a proposal with them. So it's actually benefited in more than a few ways."

- Demonstration Partner Contractor

For more information

Project website:

http://eis.lbl.gov/smallcomm.html

Jessica Granderson,
510-486-6792
JGranderson@lbl.gov